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GAS

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A JENKINS PUBLICATION

Twenty-Sixth Year of Publication

August, 1950 ECA NBP **Vol. 26—No. 8**

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GAS is published monthly by Jenkins Publications, Inc., 198 South Alvarado Street, Los Angeles 4, California. Subscription price, United States and possessions, Canada, Mexico, Cuba, South and Central American countries (in advance), 50 cents the copy; one year, $2.00; two years, $3.50; three years, $5.00. All other countries, $3.00 per year. Acceptance under Section 34.64, P. L. & R. authorized. Member: The Controlled Circulation Audit, Inc.; National Business Publications, Inc.; Society of Business Magazine Editors. GAS is indexed regularly by Engineering Index Inc. Publishers: BUTANE-PROPANE NEWS; Handbook BUTANE-PROPANE GASES; BOTTLED GAS MANUAL, WESTERN METALS.

EDWARD TITUS

THERMALLY THINKING

Vigilance is Vital

SOME OF THE ECONOMIC THINKERS who inspired the New Deal had the theory that wars could be used to carry out their pet ideas.

During a war governmental controls can be extended, some of them perhaps permanently. Certain do-good theories can be carried out, and put into effect forever.

If the war clouds are gathering, it therefore behooves any who are eternally vigilant about our liberties to keep their eyes open. While our attention is diverted by an emergency abroad our creeping revolution can move ahead at home.

A weathered Washington observer in 1941 pointed out that the preparations which preceded Pearl Harbor were marked by blanket conferring of authority on the Executive. This, he said, contrasted with World War I when a liberty conscious Congress voted much more restricted wartime powers.

A straw in the wind recently has been the re-invigorating of the National Fuel Policy idea. "National fuel policy" is a fine, good sounding phrase. In war or preparation for war a fuel policy is essential. The danger is that it might develop into a permanent Washington bureaucratic dictatorship, of unnecessary stringency, over all fuel. Eight mimeographed pages on national fuel policy were read to a Senate committee by the Secretary of the Interior on July 13. The Secretary advocated that Senator O'Mahoney's bill to establish a commission for the coal industry be considered in conjunction with Senator Myers' proposal for a full investigation of all fuels and energy. Harmless sounding on the surface. But watch it.

Speaking of Coal

THE COMPLIMENT the oil heat industry recently has paid natural gas by organizing little "oil heat institutes" in the Northeast, apparently in an effort to abate the rising tide of gas acceptance, now has been matched — or rather outstripped — by the anthracite coal industry.

Aiming to counteract the trend to gas the anthracite people in mid-July commenced the largest promotional campaign in their history. The campaign will cost the impressive sum of more than $3 million. It will include an immense advertising program, as well as research to attempt to find how the burning of anthracite may be made more attractive and convenient to the householder and his wife.

Following in the footsteps, but not exactly aping, the methods of the American Gas Assn., the Anthracite Institute will toss in more than $1 million in 12 months chiefly for television and newspaper advertising.

This amount, it is said, will be matched by producing companies with newspaper and radio advertising.

The institute, in addition, will spend $600,000 chiefly for research. This rather elastic sounding fund will also be used to acquaint consumers, through personal follow-up, with developments in equipment for burning anthracite. And the institute also will give greater assistance to manufacturers of anthracite-burning equipment.

Those capable salesmen for gas heat, the union leaders in the coal industry, are behind the present effort to bolster anthracite. Mart F. Brennan, president of District No. 7, United Mine Workers of America, speaking supposedly for all anthracite miners, emphasized the good relations said to exist now between miners and operators.

Mr. Brennan went so far as to say that the miners would produce all the coal needed in the foreseeable future, and that the public could be assured of a continuous supply of good, clean, hard coal (not as clean as gas).

The anthracite campaign is one more reason why the gas industry cannot afford to sit on its haunches and regard the heating load as something that automatically belongs to it.

Incidentally individuals and individual groups representing other competing fuels have resorted to some methods in fighting gas that were not the most sporting.

But let's hope the anthracite boys keep their campaign, particularly the rather elastic $600,000 research part of it, free from smears and as clean or cleaner than anthracite.

Another Fuel to Bat

AND HERE'S A BREAK for electricity:

Bulletin LR-11 of the Public Housing Administration includes the new federal formula for selection of fuels. Through this formula, the PHA, with government authority behind it, attempts to advise those who select fuels for PHA low rent housing.

Couched in seemingly impartial terms, the bulletin nevertheless is loaded with figures and formulas that are declared to favor the electric side of the fence.

As C. George Segeler, engineer of utilization of the American Gas Assn., put it in a recent speech:

"The impact of the difference in our figures and those used by PHA is terrific, because their figures yield a lower estimate of electric operating cost than we believe to be possible in practice."

Constructive side is that gas people have succeeded in getting some modifications of policies mirrored in this bulletin. We're told the figures on maintenance costs have been revised to be more in line with facts and therefore more favorable to gas. But a lot more amendments to this bulletin are needed to make it accurate.

What can the gas man who is bidding on one of the numerous federally aided housing projects that are coming up do about it?

"If we do not like what Uncle Sam has to offer," Segeler said, "now is the time to educate our local housing authorities by placing before them plenty of data: unbiased, comprehensive, accurate and local. If you do not have such data now, it will have to be developed from sources within your own territory or from nearby places."

The advantages of gas are so great that even with the dice loaded against the gas man via an unfair government bulletin, gas often can win out anyway.

But it would be nice to get the dice unloaded!

An Important Announcement to America's—

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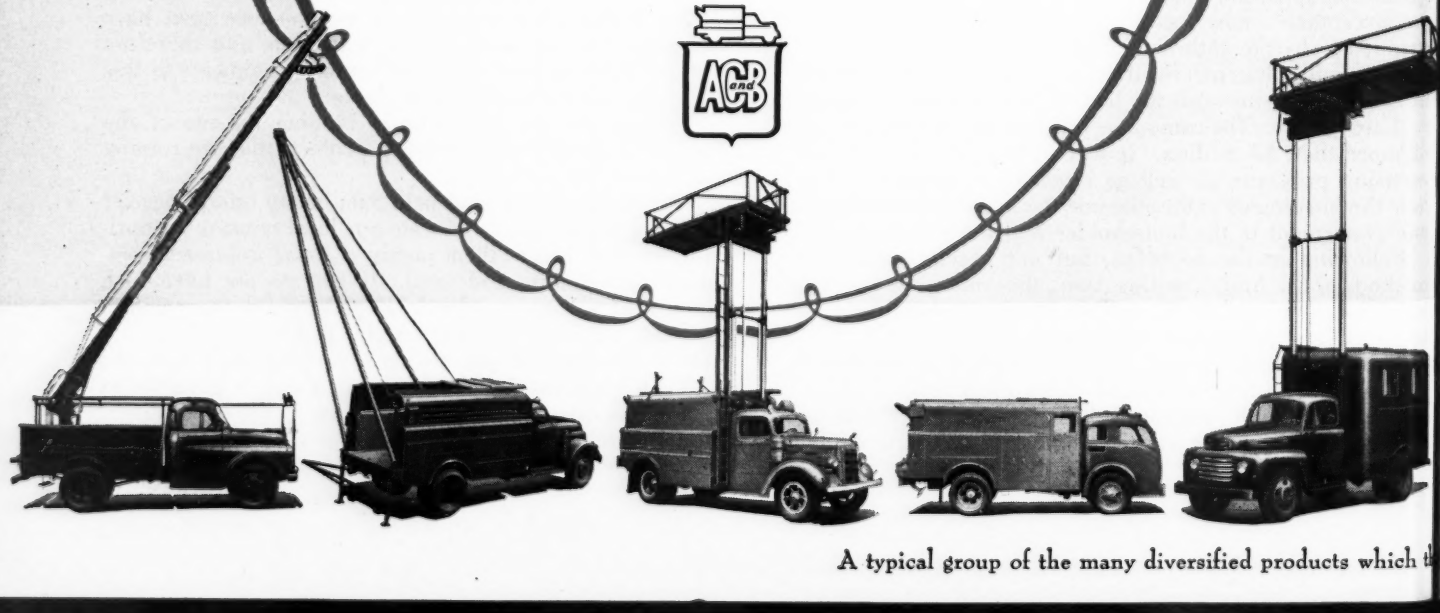


A typical group of the many diversified products which t

GUY CORFIELD

TECHNICAL TRENDS

LP-Gas Storage Underground

THE STORAGE OF GAS in natural underground reservoirs that formerly held oil or gas has proved eminently successful and is now widely used in many areas to provide peak supply and assist the load factor and demand charge in operation of natural gas pipelines. A parallel exists in LP-Gas operations. One of the greatest problems and expenses has been in providing tank storage for the liquid so as to permit year-round production with fluctuating use, and to supply peak demand in large quantity when needed for winter fuel. Accordingly there has been considerable study and experimentation on the storage of LP-Gas underground.

The requirements for an underground reservoir for LP-Gas storage are obviously even more exacting than those for gas storage, because the value of the liquid and the necessity for purity make it uneconomic to have any significant loss or contamination in the reservoir —in fact such requirements would almost seem unattainable. Several full-scale tests in south Texas, using partially depleted gas condensate sands, were disappointing in that the LP-Gas when withdrawn was so badly contaminated with both light and heavy hydrocarbons as to need complete reprocessing.

However, a cerefully selected site in the Carthage field, Panola county, Texas, in a clean sand of good porosity where the propane can displace water, and vice versa, has so far proved very successful for the storage of propane. The combination injection and withdrawal well is located roughly in the center of a triangle formed by three water wells which can be used for either "relief" or "flood," i.e., can be used to withdraw water to permit entry of the propane if the underground pressure becomes too high during injection, or to inject water to drive the propane out of the formation if the well will not produce by natural flow during withdrawal.

The propane is injected as liquid at about 1850 psig at a rate of 70 gals./min. and can apparently be produced at a rate of approximately 500 bbls/day without damaging the structure or picking up more than a small amount of absorbed water. So far, approximately 53,000 bbls of propane have been injected and 16,000 bbls withdrawn. Performance has been similar to a constant volume gas reservoir and withdrawal has been by natural flow rather than by water drive. Inasmuch as the operations have not been at a temperature-pressure level which would involve compressibility of the propane liquid, it is believed that the drive causing this natural flow results from gas dissolved in the underground salt water.

At this stage it is considered that the undertaking is technically and economically successful, and that the immediately available storage in this reservoir will be approximately 150,000 bbls with an ultimate as high as 1 million bbls. While this is, of course, only one localized project, it appears to be a most ingenious and promising approach to the general problem and again points to the ingenuity and skill of geologists and "sub-surface" engineers.

Natural Gas Coke

IN MARCH OF THIS YEAR Godfrey L. Cabot Inc., one of the principal carbon black producers in the United States, began semicommercial production of a brand new form of carbon from natural gas. Unlike the usual fine soft "sooty" carbon black, the new material is produced directly in the form of solid hard beads about 1/16th in. in diameter. Because of its resemblance in structure to coke it has been named "gas coke."

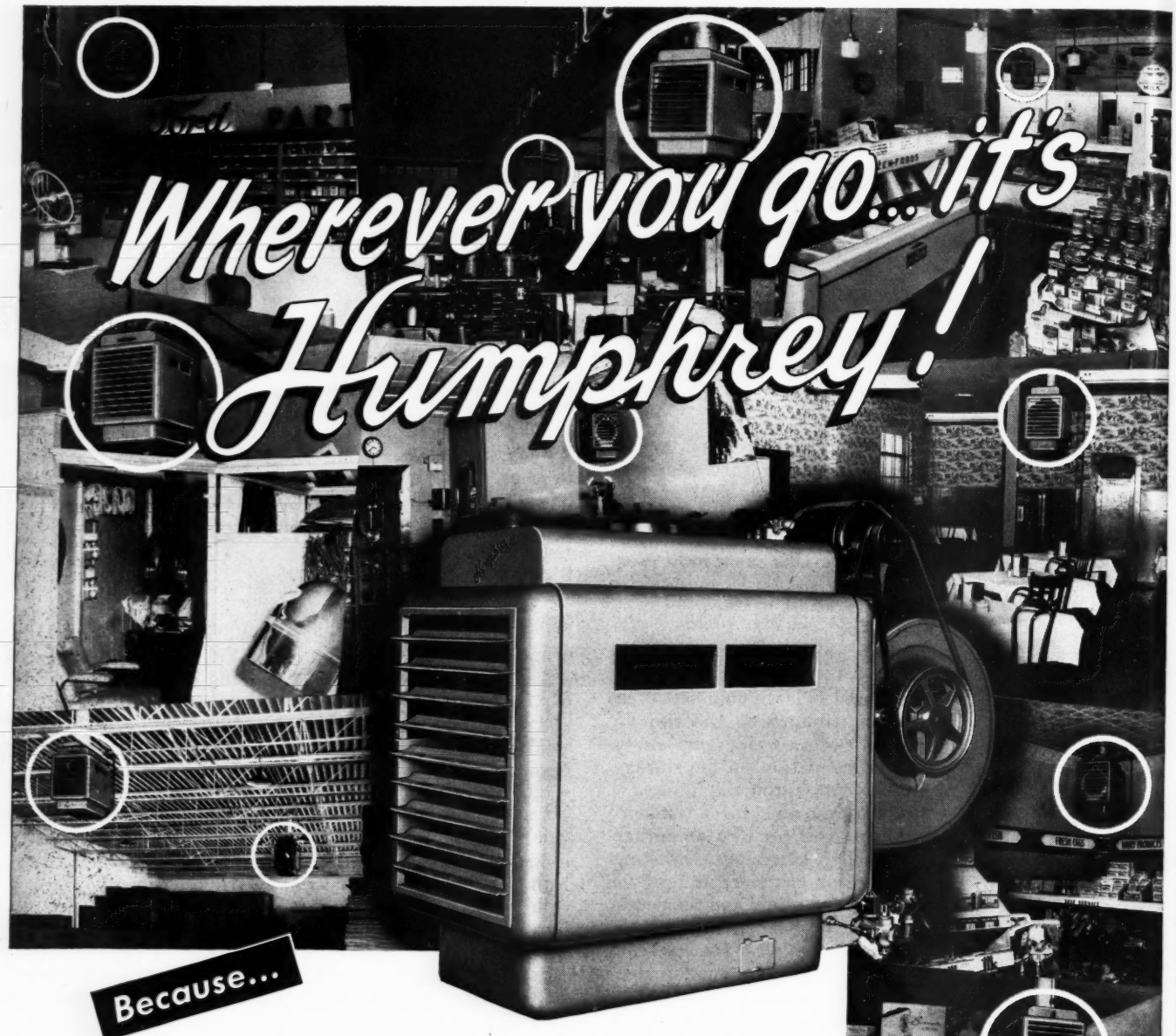
Its outstanding property is its extremely high purity, 0.05% sulfur, no phosphorus, 0.5% ash, exceeding all other industrial carbons including graphite. Its most attractive use is in metallurgical industries as a carburizer, because its low combustion rate results in less burning and more absorption into steel than is the case with other carburizing carbons. The industrial demand already indicated exceeds the capacity of the semi-commercial plant now built at Pampa, Texas.

It is stated that the burning technique is the key to the manufacturing process. Patents have been applied for and details have not yet been revealed. Existing furnace or channel plants are not adaptable. The present production is sold by American Briquet Co. of Philadelphia, or through the Boston offices of Godfrey L. Cabot Inc.

Flame Propagation

THE RECENT AMERICAN CHEMICAL SOCIETY MEETING in Detroit, reviewed in *Chemical & Engineering News* of May 1, 1950, discussed many papers on many subjects. Of basic interest to the gas industry were four papers, by investigators working under the National Advisory Committee for Aeronautics, which dealt with rate and other phenomena of flame propagation.

From flame propagation rate measurements made on a variety of hydrocarbons it was stated that maximum flame velocity occurred when the combustion mixture contained slightly more than the stochiometric proportion of fuel; in aliphatic compounds, flame velocities were found to decrease from alkynes to alkenes to alkanes; length of chain of saturated compounds had little effect on the rate, but was an influence in unsaturated compounds; branching of hydrocarbon chains decreased the rate; the addition of water increased the rate; and when the combustion mixture was preheated without water addition the flame velocity increased with increasing preheat at an increasing rate.



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STANLEY JENKS

PROMOTIONAL NOTES AND NOTIONS

Turning on the Heat

IN LESS THAN 60 DAYS from now, believe it or not, in many parts of the country, the wintry winds will be whistling through the trees and the chill breath of the approaching winter will be prompting us to turn on the heat. Gas heat? Of course—in rapidly increasing quantities, as the full weight of the current national gas heating campaigns pays off with more and more installations.

Last month, *GAS* gave this heating campaign the wholehearted editorial support it merits. Nobody in the gas industry should have any illusions about the importance of the load itself or the significance of the seed we are sowing now and the crop we can reap.

Competition

DESPITE OUR MANY ADVANTAGES, getting the heat load has never been a push-over, nor will it be, so long as we have competitors with large vested interests to protect. The better mousetrap formula went blooey the very instant the chemical manufacturers found that they could make a couple of bucks peddling poisons.

In the heating field, the oil people, with millions invested in oil burner production facilities, are not going to surrender without a fight. They fought for the business they have and will fight on to retain it. It is to be hoped, for the oil industry's sake, that the below-the-belt slugging cropping up along the East Coast, and prompted by the advent of natural gas, is not a true index of the oil industry's competitive tactics.

Misrepresentation, of course, is forgivable only where ignorance of the real facts prevails. As a desperate expediency, it has a nuisance value at the most; but, as a regular policy, it has no merit. It inevitably boomerangs, and that is why I suggest we don't let ourselves be misled by the squeals of local oil burner sales groups. Top management in the oil burner industry is too smart to play it that way. However, it can definitely be expected they will fight all the harder to build their market until they can gracefully replace their existing oil burning volume with gas heating equipment, as some have already started to do.

Kilowatt Comparisons

OF COURSE, RIGHT NOW, electricity for house heating on a general level is not a serious house heating competitor, despite the 10,000 or so electric central heating installations on the West Coast, made possible by political prodigality in the public power field. But the electric industry, as we are well aware with other loads, misses no bets. It is seriously studying a place for itself in the central heating field and already making guinea pig installations at strategic points.

It has three available methods: (1) the heat pump, (2) the electric furnace, and (3) the radiant panel.

For convenience, controllability, or comfort, it hasn't a thing to offer more than ourselves. Its greatest disadvantage is its cost of operation. Aside from a few hardy pioneers, operating cost has the electric industry really stumped at present. But it has its dreams, and hopes that some day its dreams may come true. As Fred A. Compton, vice president, The Detroit Edison Co., talking about electric house heating, told the 16th Annual EEI Sales Conference in Chicago last April, "After all, we have been preaching the doctrine of 'Living Electrically' and we should then welcome the opportunity of exploring this new application of electricity."

With us, who have no quarrel with any industry fully exploring its development possibilities, since it is a persistent trait of our own, electric heating today is not even a threatening speck of a cloud on the horizon. Our sun is shining, and we ought to be making all the hay we can while our sun is shining. A gas heating installation today is our best protection against any future electrical storms which may or may not come.

In fact, a gas heating installation today is first-class insurance against the loss of any competitive load, whether it be cooking, water heating, refrigeration, local space heating, or clothes drying.

Utility Merchandising

TALKING ABOUT ELECTRICAL competition, it might be well at this time to consider why electric utilities have reversed the trend and are going back into the direct appliance merchandising field.

There is no simple answer to the question, except that merchandising profit in itself is the least of their reasons.

Probably the outstanding reason is the changing pattern of the domestic load and the inability of the average dealer to pioneer new uses for the service. Deep freezers, garbage disposers, clothes dryers, and automatic washers are typical examples.

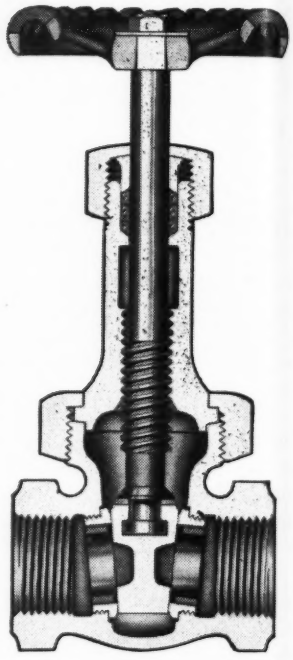
The electric utilities, with many new customers and increased generating capacity and distribution facilities, cannot await, nor can they afford to entrust, the pioneering development of these new loads to the line-of-least-resistance promotional efforts of dealers, whose interest is in a quick buck—the quicker, the better.

Through the years, this page has repeatedly advocated a balanced utility-dealer merchandising program, in which the utility (1) sets a profitable appliance standard for its dealers and (2) only pushes those appliances which the dealer cannot or will not sell.

In this way, the dealer, properly handled, recognizes the gas company as a sower of seed, to be harvested later by the dealer, and not as another competitor taking advantage of its prestige and circumstances to drain profits out of an existing market.

Every sales manager, in balancing his dealer-utility program, should recognize those appliances which have already gained public acceptance and encourage his dealers to the limit with them.

For a broader selection of quality piping
Look always to CRANE



300-Pound Brass Gate, for steam up to 550° F.; for cold services up to 1000 pounds, depending on valve size. Screwed end valves from ¼ to 3-inch. Flanged end valves from 1 to 3-inch.

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Depending on size, these valves have a union or bolted bonnet. This assures a tight bonnet joint, yet one easy to dismantle and reassemble without injuring valve. Made in Rising and Non-Rising Stem patterns, with screwed or flanged ends. Lugs on screwed ends give secure wrench grip. See your No. 49 Crane Catalog, page 21.

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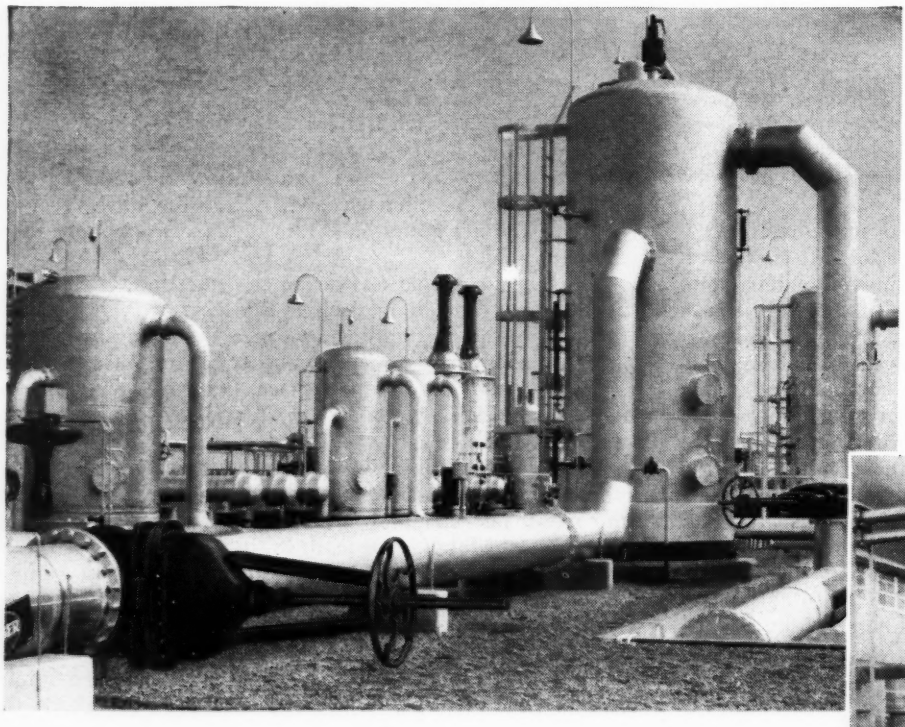

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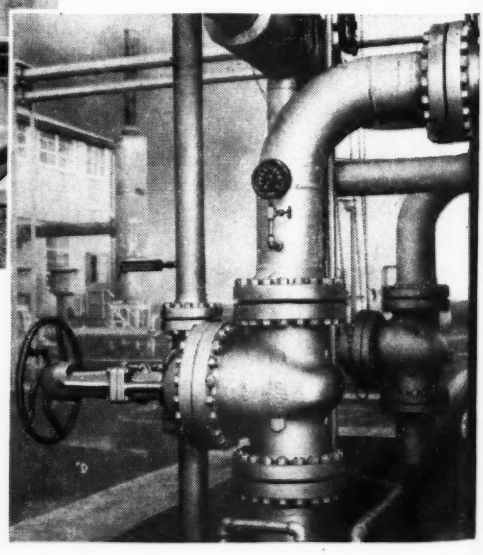
BOOSTER STATION *equipped with Crane 12-in. steel gate valves, chain wheel operators, flanged and screwed fittings.*



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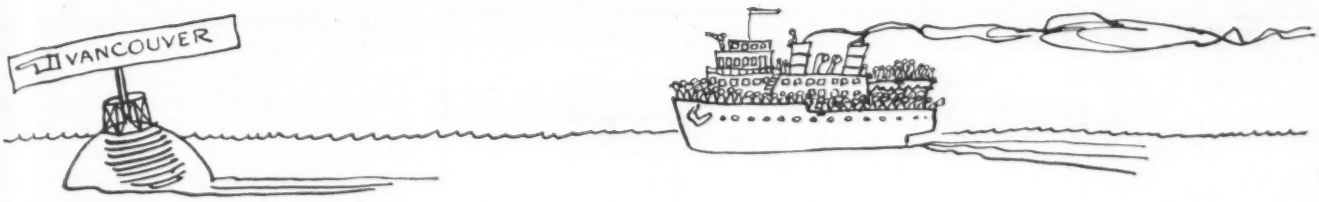

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Convention chairman

Voyage to Canada Top Attraction For Pacific Coast Conventioneers

SOME of the most valuable gasmen in the United States are leaving the country this month.

But they'll soon be back. They're just going across the world's friendliest border for a bit of relaxation during the 57th annual convention of the Pacific Coast Gas Assn., which is starting July 31 in Seattle and winds up Aug. 3.

The trip, an all-day boat ride aboard a Canadian Pacific Princess ship, will carry conventioneers to Victoria, on Vancouver Island in the province of British Columbia, for the big social event of the association's week. It is expected to lure a sizable crowd despite the remoteness of the locale from the home bases of the majority of the PCGA membership.

The Canadian flavor will be further accented by one of the headline speeches on the program, the luncheon address by Alberta's Premier Ernest C. Manning on "The Natural Resources of Alberta." The premier's message will give a clue to the possibilities of importing gas from the burgeoning petroleum pools of the northwest province, and is of increasing importance to large sectors of the U. S. in view of the recent application of Pacific Northwest Pipeline Corp. to bring natural gas from Texas into the same area (see "Pipeline Section.")

Under the leadership of N. Henry Gellert, president of Seattle Gas Co. and retiring president of the association, convention committees have constructed a program whose emphasis leans toward the reviving interest in selling. A dinner meeting Monday evening, the first event on the program, will spotlight a play titled "Paradise Lost—Paradise Regained," in which personnel from the Los Angeles utilities will dramatize the domestic use of gas. Maxine Howe and W. Q. Kringle of Southern California Gas Co. and W. Darrell Milton of Southern Counties are included in the cast.

At Tuesday morning's general session, following the president's address and the reports of section chairmen and the nominating committee, gas super-salesmen Hugh Cuthrell of Brooklyn Union Gas Co. and Stanley H. Hobson of George D. Roper Corp. will beat the drums for harder appliance selling.

PROGRAM

MONDAY, July 31

DINNER MEETING, 6:30 p.m.
"Paradise Lost—Paradise Regained"
Drama enacted by personnel of Southern California - Southern Counties Gas Co.'s.

TUESDAY, Aug. 1

GENERAL SESSION, 9:30 a.m.
President's Address
N. Henry Gellert
Reports of Section Chairmen
Accounting—John E. Wolfe
Manufacturers—C. A. Gabriel
Sales—J. L. Hall
Technical—R. W. Todd
Report of Nominating Committee
A. H. Sutton
"Gas Takes the High Road"
Hugh H. Cuthrell
"Gas Appliances Unlimited"
Stanley H. Hobson

GENERAL LUNCHEON, 12:15 p.m.
"The Natural Resources of Canada"
Hon. E. C. Manning

GENERAL SESSION, 2:30 p.m.
"How Minneapolis Built its Natural Gas Sales"
Harry K. Wrench
"Promotional Rates for Natural Gas Sales"
George F. Mitchell
"The Customer Is King"
Owen Clarke

MANUFACTURERS FRIENDSHIP HOUR, 6:30 p.m.

WEDNESDAY, Aug. 2

THE CONVENTION GOES TO CANADA, 8 a.m.

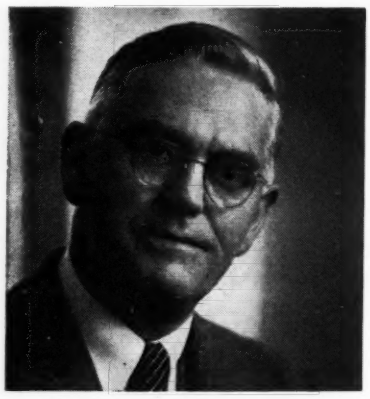
LUNCHEON, 1:15 p.m.
Introduction of Past Presidents
J. F. Pollard
Report of Awards Committee
R. T. Peterson

THURSDAY, Aug. 3

GENERAL SESSION, 9 a.m.
"The PG&E Super Inch"
Sound movie
"High Btu-Gas for Interim Use and Natural Gas Standby"
K. W. Stookey
"Financing Utility Expansions in the Northwest"
Joseph Muckley
Installation of Officers

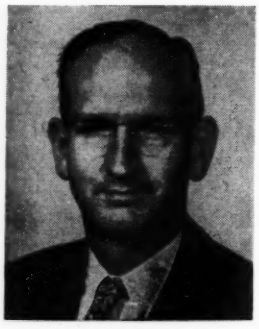
GOLF TOURNAMENT, 12:30 p.m.

PCGA SLATE OF OFFICERS



E. G. LAWSON
President, Pacific Public
Service Co., San Francisco

PRESIDENT



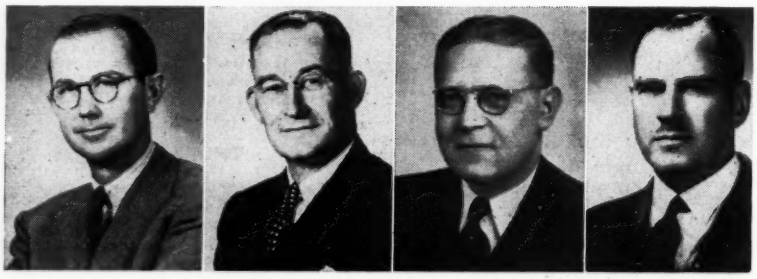
W. M. JACOBS
Vice President
Southern California Gas Co.
Los Angeles

VICE PRESIDENT

HARRY McGANN
Auditor
Pacific Gas & Electric Co.
San Francisco

TREASURER

DIRECTORS



W. J. BAILEY JR. **F. B. WRIGHT** **C. H. GUEFFROY** **J. S. MOULTON**

After the luncheon at which Premier Manning will speak, members will return to the afternoon general session to hear Harry K. Wrench, president of Minneapolis Gas Co., George F. Mitchell, president of Peoples Gas of Chicago, and Owen Clarke, chairman of the Washington Public Service Commission. Their themes: aspects of the business directly or indirectly related to load building.

Canadian Trip

In Canada on Wednesday, conventioneers will gather at the Crystal Gardens for a luncheon to be marked by introductions of past presidents by James F. Pollard, Pacific Gas & Electric Co.'s commercial department manager, and a report of the awards committee by R. T. Peterson, PG&E gas supply superintendent.

A conducted tour of famed Butchart's Gardens will follow, with embarkation for the return trip at 5:30 p.m.

The PG&E movie and speeches by K. W. Stookey of Gas Machinery Co. of Cleveland and Joseph Muckley of Seattle-First National Bank are on the Thursday morning agenda, with the traditional golf tournament taking up after lunch.

All meetings except the Canada luncheon will be held at the Olympic hotel in downtown Seattle.

Officers

New officers on the slate for election at the meeting are headed by E. G. Lawson, president of the Pacific Public Service Co., San Francisco, incumbent vice president, who has been selected for next year's presidency. W. M. Jacobs, vice president, Southern California Gas Co., will move up from his place on the board of directors to take Mr. Lawson's former post. Harry McGann, auditor of division accounts, PG&E, is due to replace D. G. Martin, general auditor, PG&E, as treasurer. New directors will include W. J. Bailey Jr., vice president, affiliated Gas Equipment Inc., Monrovia, Calif.; C. H. Gueffroy, president, Portland Gas & Coke Co.; J. S. Moulton, vice president, PG&E; and Frank B. Wright, vice president, Southern Counties Gas Co., Los Angeles. Mr. Gueffroy and Mr. Moulton are incumbents.

The ladies will have their program too. In addition to joint social events, they will participate in a sightseeing tour around Seattle, a tea, and a bus trip to Mount Rainier. Mrs. N. Henry Gellert will act as official hostess.

Other convention officials include W. C. Mainwaring, vice president of B. C. Electric Co., Vancouver, program chairman, and Charles M. Sturkey, vice president, Seattle Gas Co., convention arrangements director.

INTRODUCTION

DURING THE EARLY SUMMER of 1948, negotiations between the Transcontinental Gas Pipe Line Corp. and the five gas companies in the New York City and Long Island area had developed to a point where it was fairly certain that natural gas would be available in the fall of 1950.

The amount of gas that would be available to the New York companies would be as follows:

Company	*MMcf/day*
Brooklyn Borough Gas Co.	9
Brooklyn Union Gas Co.	60
Consolidated Edison Co.	100
Kings County Lighting Co.	11
Long Island Lighting Co.	25

The delivery point of the natural gas by Transcontinental would be at the east bank of the Hudson river. The local gas companies were to be responsible for installing facilities to distribute the natural gas from this point to the gas generating stations. Since it did not appear desirable for each gas company to install separate lines to the supply point because of economic, operating, and franchise problems, a committee was formed that consisted of a member appointed by each company. The committee was charged with the responsibility of determining the approximate route of the main and size and length of pipe, and to prepare a general design specification.

The general design specification was to include an agreement covering the following:

1. Design basis for determining pipe size.
2. Purchase specification for pipe.
3. Line valves.
4. Pipe protection.
5. Method of installing pipe.
6. Acceptance pressure tests.
7. Methods of preventing pressure fluctuations.
8. Metering.

At this time the pipe mill production schedules were booked solid until 1950 for the sizes of pipe that were required. The scheduled deliveries from pipe fabricators were not as tight, but there was a question as to whether or not we would be able to obtain in time the pipe required to meet the 1950 delivery date of the natural gas. Consequently the committee expedited the design work and was able to submit its report within one month. Committee activity is continuing with attention being given to common problems that arise.

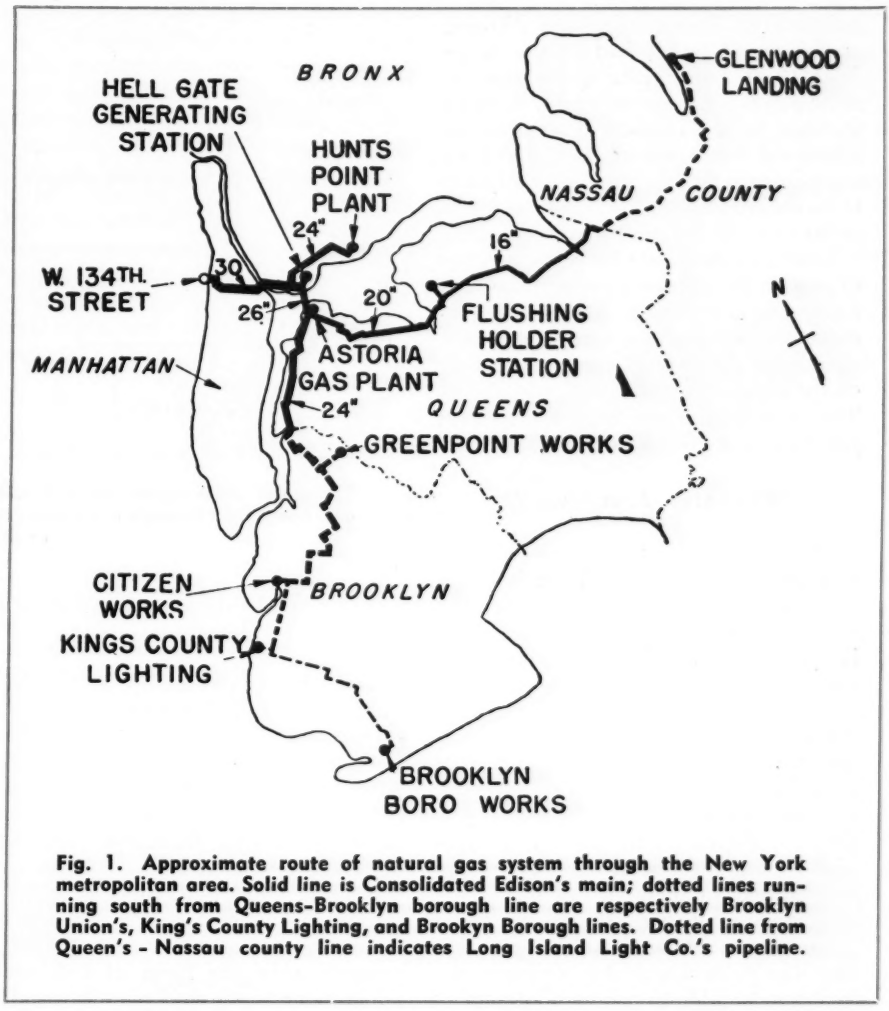


Fig. 1. Approximate route of natural gas system through the New York metropolitan area. Solid line is Consolidated Edison's main; dotted lines running south from Queens-Brooklyn borough line are respectively Brooklyn Union's, King's County Lighting, and Brookyn Borough lines. Dotted line from Queen's - Nassau county line indicates Long Island Light Co.'s pipeline.

How Five Companies Joined Forces To Bring Natural Gas to New York

By F. G. SANDSTROM

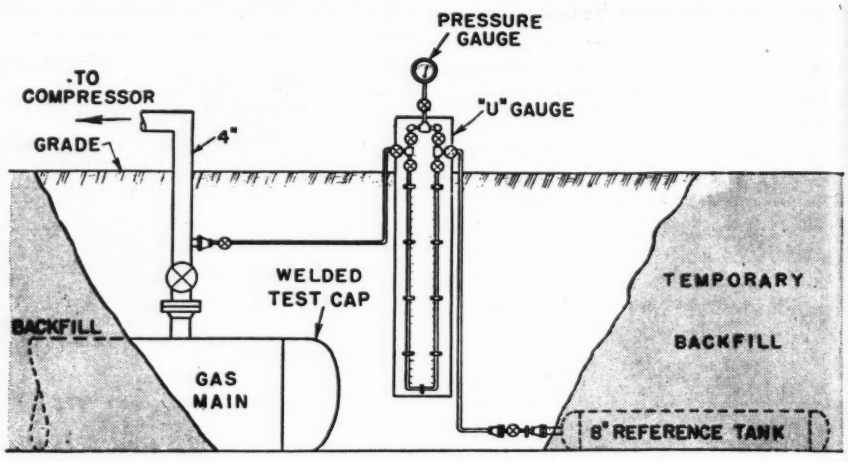
A large gas main running through a congested metropolitan area involves many problems not encountered in the usual run of long distance natural gas transmission lines, which avoid such areas as far as possible. Preliminary choice of a route can be only tentative until a complete survey of the subsurface structures has been made. Many route changes and detours are necessary to avoid unusual subsurface hazards such as subway stations, major water lines, sewers, and streets completely blocked by structures of one sort or another. Even after the best possible route has been selected, the congested subsurface will require that the natural gas main include offsets, bends, and occasional short sections of reduced size in order to bypass particular structures in the limited space remaining under the roadway.

The inter-company committee determined approximate route lengths for a radial system of mains from the supply point to all the points at which the five companies planned to use the natural gas. The general route was determined largely by the location of these points of use and of existing gas main tunnels which could be used for three of the five major river crossings in the metro-

The author, engineer for Consolidated Edison Co. of New York, New York City, presented this paper at the AGA Distribution, Motor Vehicle, and Corrosion Conference, Detroit, April 3-5.

politan area. Pressure limits of 200 psig at the supply point and in the range from 10 psig to 30 psig at the most remote plants were agreed upon. With an increase in the amount of natural gas scheduled for some of the New York companies, a higher pressure will have to be maintained at the supply point in order to hold terminal plant pressures.

Unit installed costs for various sizes of pipe in the different parts of the area were also determined. After an agreement was reached on these data, pipe sizes were determined for each section on the basis of the cheapest over-all job. The approximate route of the natural gas main system is shown in *Fig. 1*.



Method of checking for leaks. A reference tank is buried adjacent to the main and connected through a U-gauge, which is so valved that it can be bypassed or disconnected.

"Facilities Agreement"

The report of the committee was used as a basis for the "New York facilities agreement." Features of interest in the agreement are the provisions for sharing the responsibility for installation maintenance and apportioning the carrying and maintenance charges. Each company is to install and maintain the sections of the line within its own franchise territory. The carrying and maintenance charges for each section are shared by the various companies on the basis of the amount of gas transmitted to them through the particular section to meet the system maximum design demand. An exception to this was made where one company, desiring to be able to use its allotment of natural gas at either of two plants and thereby increasing by one size the run of pipe in a common section, agreed to assume the carrying charges on the extra cost of the larger size main.

Each company is installing metering at its takeoff from the natural gas mains system and the supplier is metering the total at the point of supply. The difference between the supplier's metered total and the total of the takeoff meters for any period will be apportioned to the various companies in proportion to the amount used by each during the same period. Check metering at the point of supply is also being installed by Consolidated Edison Co.

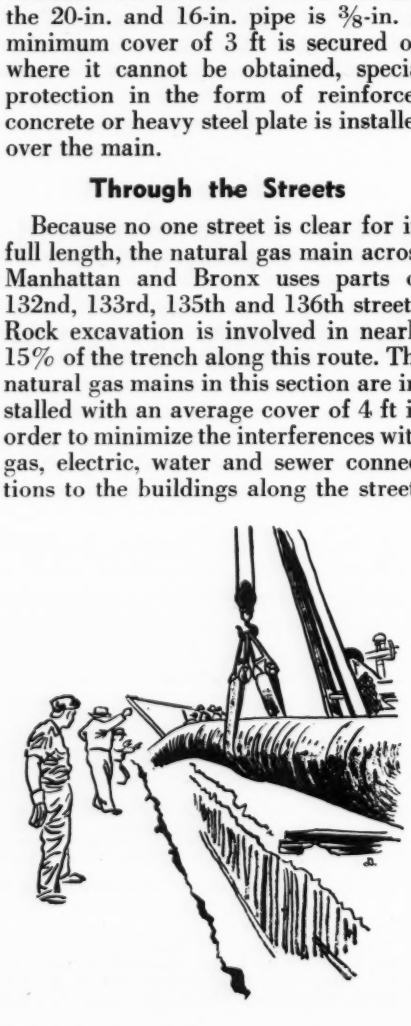
Hudson Crossing

The Hudson river crossing is being designed and constructed by the supplier, who is also providing a metering station for its meters and the Consolidated Edison check meters. This station will be on pile foundations offshore in the river and connected by a short bridge with the shore. The submarine crossing terminating at the metering station will consist of one 26-in. diameter, 1⅛-in. wall main jetted into the river bottom. The outlet from the metering station will be one 26-in. main crossing the bridge and connecting to the 30-in. underground main at the shore.

The natural gas mains in the New York area are being designed for 350 psi maximum working pressure and are to be tested at 425 lb air pressure. The 30-in. pipe and those sections of the 24-in. pipe having unusual exposure have ½-in. wall thickness. The wall thickness on the rest of the 24-in. and the 20-in. and 16-in. pipe is ⅜-in. A minimum cover of 3 ft is secured or, where it cannot be obtained, special protection in the form of reinforced concrete or heavy steel plate is installed over the main.

Through the Streets

Because no one street is clear for its full length, the natural gas main across Manhattan and Bronx uses parts of 132nd, 133rd, 135th and 136th streets. Rock excavation is involved in nearly 15% of the trench along this route. The natural gas mains in this section are installed with an average cover of 4 ft in order to minimize the interferences with gas, electric, water and sewer connections to the buildings along the streets which the mains traverse. Vertical offsets are used at many intersections in order to clear all the facilities on the cross streets—except, of course, the sewers, which generally are deep enough not to interfere with the gas main. Horizontal offsets around some existing facilities have been necessary also. In the 19,000-ft run of 30-in. main almost 200 forged bends were required for horizontal and vertical offsets and turns.



At two major intersections on low ground in the Bronx it has been necessary to go below the sewers because they were so shallow. The excavations were below tide water level and to complicate further the installation at one point, the main goes under two duct banks, one containing 60 ducts for telephone cables and the other 40 ducts for railroad cables, the latter having been installed initially on a pile foundation.

Over Subway Roof

Where the cover over the transit subways amounts to only 3½ or 4 ft, it has been necessary to offset upward in order to carry the natural gas main over the subway roof. Special protection is required for the main because it is close to the pavement. The special protection is provided in the form of a thick reinforced concrete box enclosing the top and sides of the main, clear of the main and supported on the subway roof. This box is vented to the atmosphere. Clearance limitations have forced a reduction in the size of pipe from 30-in. to 24-in. (½-in. wall) in these shallow subway crossings. Facilities parallel to and above the roof of the subway have to be diverted to new locations alongside the subway structure wall at these crossing points. In Brooklyn, it was necessary to offset the 24-in. main 350 ft horizontally because of shallow cover over a railroad line.

The Harlem river crossing will con-

sist of a 30-in. diameter ½-in. wall pipe to be laid (if possible) as one piece in a trench in the river bed. The pipe will be triple coated and wrapped and then coated with a reinforced layer of "Gunite" concrete thick enough to more than overcome the buoyancy of the pipe. The risers, similarly protected, will be located inland from the bulkheads in specially sheeted slips which are to be backfilled after installation. The trench in the river bottom will be deep enough to permit the gas main to be installed with 5 ft of cover between it and the normal river bottom, which at this point is 2 ft below the river bottom maintained elsewhere by dredging. After installation the trench is to be backfilled with gravel.

The Newtown Creek submarine crossing is to be of similar construction but with 24-in. diameter pipe having ½-in. wall thickness, protective coating and 2½-in. layer of Gunite concrete.

Above Ground

At two points the mains will come above ground to cross over railroad rights of way on existing bridges. One of these bridges is of sufficient length to necessitate the installation of an expansion joint at each end, while a single expansion joint will suffice for the other. On the longer bridge the main will occupy a part of the sidewalk space and will be encased in a reinforced concrete housing. On the other bridge the main will be supported on outboard brackets.

The East river crossing through the Hell Gate-Astoria tunnel requires approximately 5000 ft for the longitudinal run and 250 ft for each shaft riser, all of 26-in. OD, ½-in. wall pipe. The pipe is supported in the tunnel on bracket mounted tapered rollers except for a solid anchorage in the center of the run. The risers are supported from the shaft walls at a point approximately 40 ft below the top of the riser. Two sets of guide brackets in each shaft restrain lateral motion of the riser pipes but are designed to permit displacement of the risers resulting from expansion of the run in the tunnel and in the shafts. Lateral motion of the pipe off the rollers is prevented by the anchorage in the center and by special guides near each end. The risers come out of the tunnel shafts through the side walls of the headhouse building some 15 or 20 ft above grade. The big problem in this as in other tunnels is to find space for materials handling and working. This tunnel is roughly 18 ft high by 16 ft wide but already contains two 72-in. cast iron gas mains, one 20-in. high pressure steam main, six or more 27-kv feeder cables, two 8-in. oil pressure-type cable pipes, and a fuel oil line with companion steam line.

Plug Valves

Similar construction is used for the 20-in. diameter, ⅜-in. wall pipe installed in the tunnel under the Flushing river.

Lubricated plug valves are spaced at approximately one-mile intervals and in the lines leaving each tee point. All the valves are gear-operated. These valves are placed on concrete foundations, welded into the line, and backfilled.

Provision is being made for removing condensate from the main between Astoria and Flushing so that the line can be used for an emergency source of manufactured gas if the natural gas supply should be interrupted. This portion of the line is being laid to grade and at low spots a shallow drip is being provided.

Coatings

With the exception of the insulating joints, the joints are welded by qualified welders. The seamless pipe was protected with the following coating:

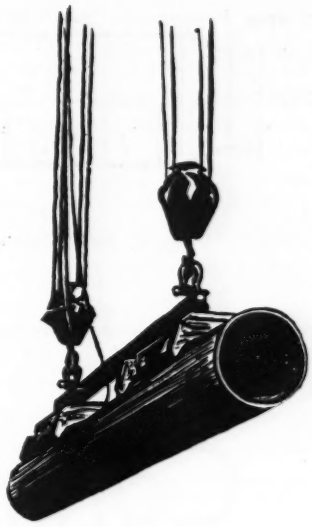
(a) 2/32 in. of Waterworks enamel
(b) Wrapping of fiber glass
(c) 1/32 in. of Waterworks enamel
(d) Wrapping of asbestos felt

On spiral welded pipe the first coating had a minimum thickness of 3/32 in.

Insulating joints are being installed at intervals from 1500 to 3500 ft, depending upon local subsoil conditions. After the main is installed in the trench, the coating is checked by means of an electrical fault detector using 12,000 to 15,000 volts. The backfill material within 12 in. of the pipe must have a pH value greater than 5.5 and the size of the material must be such as will pass through a 1-in. block mesh. Each section of the pipe between insulating joints will be protected by magnesium anodes.

Resistance Tests

The condition of the coating on the pipe is checked after backfilling by making "pipe-to-soil" resistance tests. If the insulation resistance is less than 0.5 megohms per square foot of pipe surface, an over-ground electrical survey is made over the pipe to determine the location of a possible fault in the coating.



Carbon tetrachloride, in quantity not exceeding 50 parts per million, is introduced in the air pumped into the main for the 425 psi pressure test. Bar holes are made alongside the pipe at each joint location. The General Electric Halogen detector is used to test for carbon tetrachloride at all bar holes, manholes and sewer openings. This detector is extremely sensitive and indicates 0.2 parts per million at approximately one-half scale deflection on the "M" scale of the instrument.

We believed that, with the high test pressure used on this main and because of the large volume of air contained in the main, it would take a long time for a small leak to show a positive indication of a pressure drop. Consequently, a better method of checking for leaks was developed as shown on *Fig. 2.*

Checking Leaks

A reference container is buried adjacent to the main and connected to the main through a U-gauge. Valves are installed so that the U-gauge can be bypassed or disconnected. After the pressure conditions have become stabilized the U-gauge is connected and the bypass valve closed. Any slight leak on the systems would be indicated by the liquid shifting in the gauge.

The objective of the New York companies has been to take the necessary precautions to install the natural gas main in the most approved manner. The ASA Code for Pressure Piping was used as a basis for designing the line. In addition to steps outlined above, a commercial inspection firm checked the material at the fabrication and coating plants.

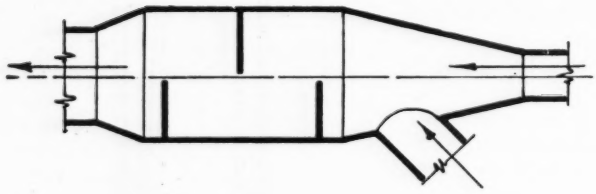


Fig. 1. Baffle mixing chamber.

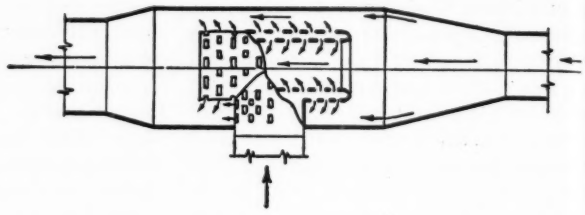


Fig. 2. Torus mixing chamber.

Controlled Gas Mixing

How Chicago built stability and flexibility into its mixing system to automatically produce 800-Btu manufactured gas from 1030-Btu natural gas and 550-Btu manufactured gas.

By W. H. Isaacs and R. B. Paquette

THE gas distributed in the city of Chicago consists of a mixed gas of 800 Btu/cu ft. This gas mixture consists primarily of natural gas at 1030 Btu and manufactured gas at 550 Btu.

Manufactured gas—the base gas—is coke oven gas augmented by reformed natural gas or carburetted water gas, depending upon the season of the year or load on the system.

These natural and base gases are blended or mixed together in automatic gas mixing systems in the proper proportions to produce a standard 800-Btu mixture for distribution to the city system.

A gas mixing system should be automatic in operation, should follow load changes of both volume and discharge pressure rapidly without changes in proportioning the two gases, should be easily adjustable, and should be stable in operation.

The gas mixing system used for the city sendout is shown schematically in *Fig. 3*.

Gas Mixing System

This system consists of a base gas line installed parallel with a natural gas line. A butterfly valve is installed in each line and these two valves are linked together mechanically. The base gas butterfly valve and natural gas butterfly valves are called the metering valves, and their function is to meter the volumes of the two gases. The metering valves are operated by a base gas volume regulator. The base gas regulator operates from the differential pressure drop across the base gas butterfly valve.

The volume regulators are hydraulically operated by oil pressure at 90 psi from an electrically driven oil pump. A piston pump driven by natural gas pressure is arranged to cut in automatically to provide oil pressure in case of electrical failure.

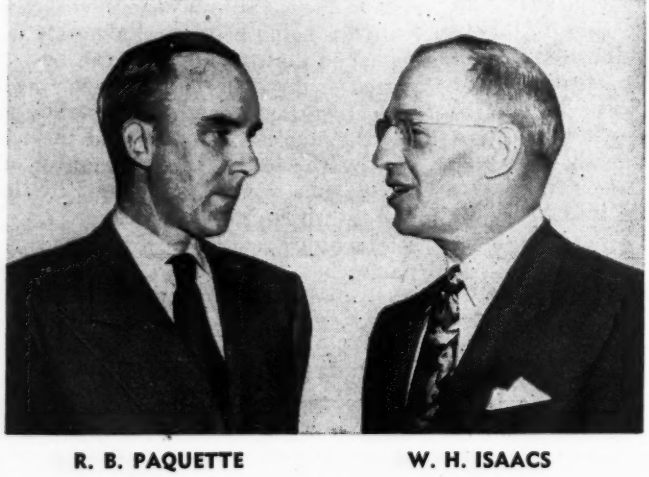
The metering butterfly valves operate somewhat similar to an orifice meter. Therefore, they should be installed in straight runs of pipe, free from obstructions for approximately 10 diameters upstream and five diameters downstream.

Mixer Operation

The base gas flows directly from the street compressors at approximately 10 psi through the base gas run of the mixer. As the demand on the distribution system changes, the volume of gas through the base gas butterfly valve changes. This produces a change in the differential pressure drop across the base gas butterfly valve. The base gas volume regulator is balanced to hold a few inches water column drop across this butterfly valve and, as soon as this pressure drop changes, the regulator moves the valve to restore the original pressure drop; thus the regulator moves the valve to hold a constant pressure drop across the base gas valve.

The natural gas butterfly valve is linked mechanically to the base gas valve; therefore, as the base gas valve moves, the natural gas butterfly valve moves with it through the same angle. This causes a change in the differential pressure drop across the natural gas butterfly valve. The natural gas volume regulator is balanced to hold a few inches pressure drop across the natural gas valve. As soon as this pressure drop changes, the natural gas volume regulator moves the natural gas regulating valve to restore the original pressure drop. Thus, the natural gas regulator holds a constant pressure drop across the natural gas valve.

The authors, Peoples Gas Light & Coke Co. (Chicago) engineers, presented this paper at the AGA Production and Chemical Conference held in New York May 22-24.



R. B. PAQUETTE W. H. ISAACS

This system of valves and regulator will thus follow load changes readily and hold a constant proportion between the two gases, without regard to changes in Btu or specific gravity of the base or natural gases.

To correct for these changes a sample of the mixed gas is passed through a calorimeter and calorimixer to determine its Btu. The calorimixer burns the gas sample and automatically operates a Btu adjusting motor, which changes the differential balance of the natural gas regulator. This changes the natural gas flow slightly to hold a constant 800 Btu in the final mixture. The calorimixer gives a fast sample in approximately 30 to 45 seconds, thus providing rapid Btu adjustment. This instrument is set to hold a constant zero point. The calorimeter burns a gas sample and gives a Btu record in 6 to 8 minutes. The calorimeter continually supervises the calorimixer to hold its zero setting at 800 Btu.

The gas mixing control system, controlled by the calorimetric equipment, will hold the Btu of the final mixture to within .5%, which is the guaranteed accuracy of the calorimetric equipment.

This system operates on the discharge side of the street compressors and delivers the gas mixture directly to the distribution system at the system pressure.

The natural gas enters the mixer at 90 psi and the pressure is reduced to distribution system pressure through the natural gas regulating valve. This system is very stable in operation and has been an operation range of approximately 10 to 1 in volume.

Gas Sampling

It is important that the gases be well mixed before they enter the distribution system and also, that a well-mixed sample be supplied to the calorimetric equipment which controls the mixer.

In order to insure a well mixed sample, the sampling point should be sufficiently remote from the mixer to allow time for mixing. The sample line should be as short as possible and of small size to avoid introducing a time lag in the sampling.

Mixing Chambers

If the plant piping system permits the sampling point to be installed sufficiently remote from the mixer, then the gas mixing will take place in the plant piping. However, in some installations the sampling point must be fairly close to the mixer and a mixing chamber must be installed to insure a well mixed gas.

A common type of mixing chamber consists of an enlarged section of piping with baffles installed inside to provide a tortuous path, as in *Fig. 1*. This baffle chamber insures a well mixed gas; however, it has the disadvantage of introducing a relatively high pressure drop in the system.

In order to reduce this objectionable pressure drop, a torus

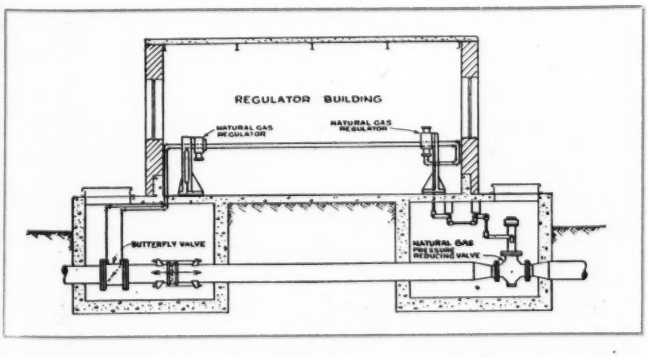
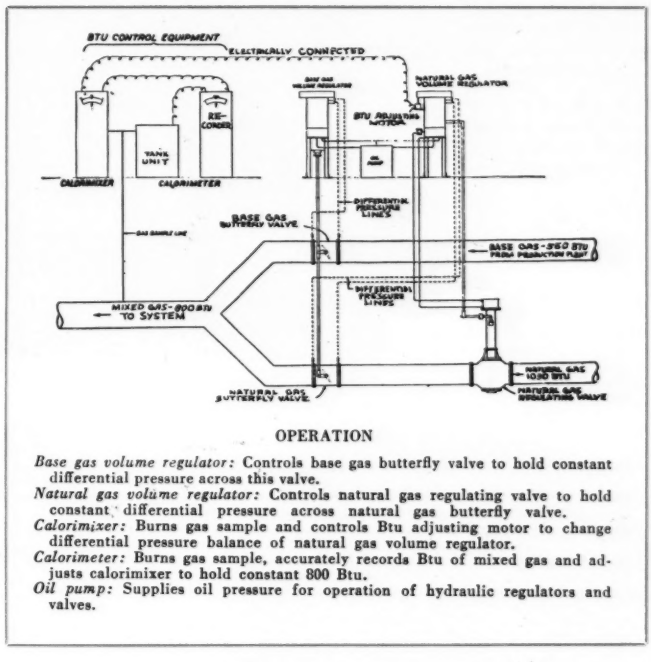


Fig. 4. Typical installation of gas mixture with underground piping.



OPERATION

Base gas volume regulator: Controls base gas butterfly valve to hold constant differential pressure across this valve.
Natural gas volume regulator: Controls natural gas regulating valve to hold constant differential pressure across natural gas butterfly valve.
Calorimixer: Burns gas sample and controls Btu adjusting motor to change differential pressure balance of natural gas volume regulator.
Calorimeter: Burns gas sample, accurately records Btu of mixed gas and adjusts calorimixer to hold constant 800 Btu.
Oil pump: Supplies oil pressure for operation of hydraulic regulators and valves.

Fig. 3. Gas mixing control system.

type mixing chamber was built as in *Fig. 2*. This mixing chamber consists of a ring made by a 24-in. pipe welded inside of a 30-in. pipe.

The ring or torus was then welded to an inlet 30-in. pipe. Slotted openings were cut into the ring. The total area of the slotted openings was 70% greater than the area of the inlet 30-in. pipe. The whole ring tee assembly was then welded into an enlargement of the discharge line.

This mixing chamber offers very little resistance to the gas flow. The gas from one stream meets a large number of small jets of gas from the other stream, so that good mixing occurs in a very short time. This mixing chamber has given good results over very wide ranges of flow.

Installation

The natural gas enters the mixers at 90 psi and is reduced to distribution system pressure through the natural gas regulating valve. This reduction in pressure is accompanied by much noise and, at high flow rates, this noise may become very objectionable.

A noise level of 122 decibles was measured on one installation. This noise level is above the feeling level and may actually induce pain as well as being objectionable over a large area.

In order to reduce this noise level and achieve quiet operation, it is advisable to install the piping and regulating valves for the mixing system underground. This allows the surrounding ground to absorb the noise vibrations. A typical installation of a gas mixer with underground piping is shown in *Fig. 4*. The regulating and butterfly valves are installed in pits and operated by regulators mounted in a building directly above them.

Some attempts have been made to soundproof mixers which are installed above ground. To reduce the noise level on these mixers, a layer of rock wool insulation 3 in. thick was installed around the piping and then covered with 24-gauge galvanized sheet metal. This method of insulating the piping and valves reduced the noise level to a point that was not objectionable in an industrial area; however, it is not as effective or would not reduce the noise to the level that could be obtained by installing the valves and piping underground.

Sincere appreciation is extended by the authors to all those who assisted in the preparation of this paper and especially to Mr. J. L. Adkins of our company who contributed substantially to the work.

Point Comfort

Natural gas produces power to produce aluminum in Alcoa's new Texas plant

Grading and excavation for the Aluminum Co. of America's Point Comfort works began in August, 1948. The first aluminum ever made in Texas was poured at the works on Feb. 11, 1950. Between these two dates, a modern aluminum reduction works was constructed on what had been a stretch of Texas ranch land.

Located on a 3000-acre tract on Matagorda bay near Port Lavaca, the plant consists of 25 buildings with approximately 18½ acres of floor space. Included among these buildings are the pot rooms where aluminum is made, the engine rooms for the production of electric power necessary for making aluminum, a carbon plant, and various plant service facilities.

A concrete and steel dock was constructed at the works. A channel, complete with turning basin, connects the dock with the Pass Cavallo-Port Lavaca channel.

The diesel-driven Point Comfort and Northern railroad, a subsidiary of Alcoa, runs 14 miles between the plant and Lolita, Texas, where a junction is made with the Missouri-Pacific line.

Aluminum is made by the electrolytic reduction of aluminum oxide. This reduction or smelting process is the heart of operations at Point Comfort, which has a capacity to produce about 114 million lbs of aluminum per year.

POWER for the production of aluminum at Point Comfort has its source in the natural gas fields of Texas. By means of generators driven by internal combustion engines, this gas is converted into the electric power required to make aluminum. It takes about 10 kw-hr of electricity to produce 1 lb of the metal.

Hydroelectric power has almost always been used for the production of aluminum in Alcoa's plants. Since low cost electric power is an important consideration in making aluminum economically, when the company was looking for new power sources it chose the Point Comfort area, with its natural gas.

The Lavaca Pipe Line Co. was organized by Alcoa to operate the pipeline necessary for gathering and distributing the gas to be used.

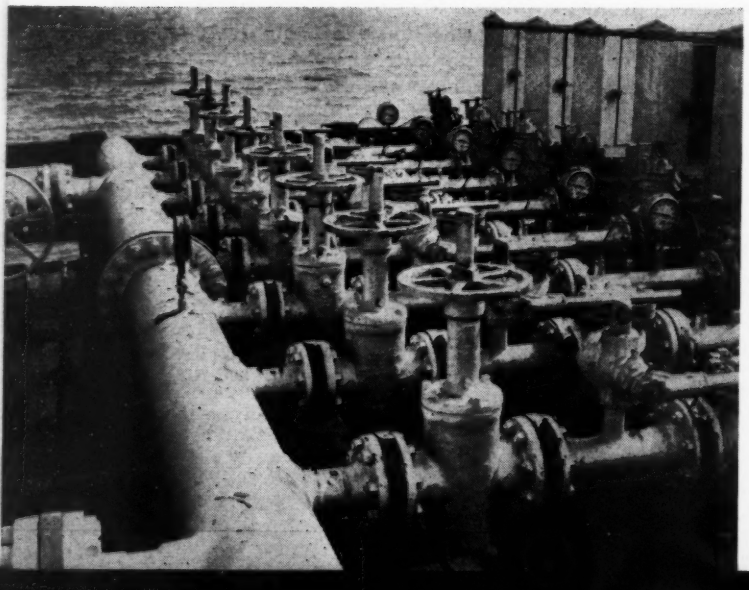
Gas is received from both on-shore and off-shore wells. One line, built in the fall of 1949, runs between the Point Comfort works and the Francitas Gas Co.'s recycling plant near Francitas, Texas. There are approximately 11 miles of 10-in. pipe and 5½ miles of 8-in. pipe in this line.

Another line, consisting of 7½ miles of 8-in. pipe, ties into the off-shore line in Matagorda bay.

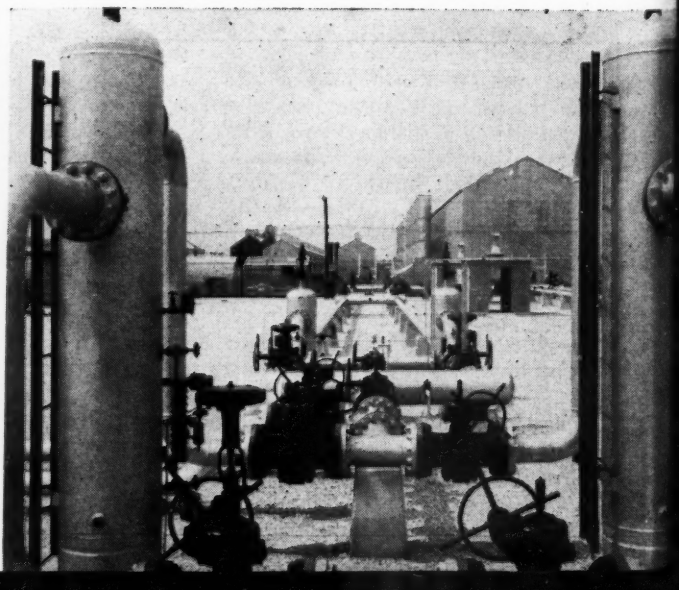
The main underwater line, in Lavaca and Matagorda bays, consists of approximately 14 miles of 8-in. pipe, about 12½ miles of it under water. In addition, approximately 9 miles of 4- and 6-in. pipe are used for the off-shore gathering lines. The average depth of water in the gas field is about 14 ft.

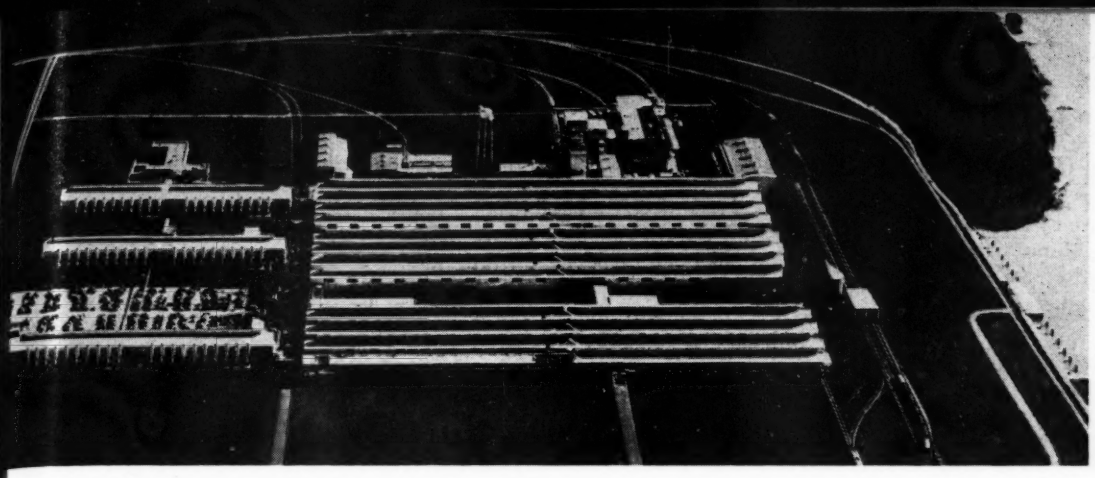
Work on the off-shore line was started in April 1948 and was completed the

GAS CONTROL and metering equipment on the platform in Matagorda bay (shown in the upper photograph).



GAS PRESSURE reducing station, showing engine rooms and pot rooms for aluminum production in background.





TOP OF LEFT HAND PAGE: gas control and metering platform in Matagorda bay.

RIGHT HAND PAGE: aerial view of plant at Point Comfort.

following October. The pipe was coated, wrapped, and then welded in 1000-ft sections. Next, five of these sections were welded in 5000-ft lengths on dollies placed on greased launching tracks. River weights and buoys were attached to the pipe, and the sections were pulled into the water by tugs.

Off-shore welding was done with the pipe held out of the water by an outrigger at the stern of a converted LST and by the boom of a dragline extending beyond the bow of the boat. After the welding was finished, the buoys were cut free and the pipe was allowed to sink.

A control and metering station, built well above the water level, is located on a platform constructed of creosoted piling. The gathering system, which includes lines from 11 wells, leads to a 12-in. header on the platform; the header, in turn, discharges into the 8-in. transmission line. Meter runs on the platform are in parallel, and the entire station layout is compact.

Magnesium anodes for cathodic protection were installed at the shore end of the line, at the metering platform, and at several intermediate points on the line.

One experimental gathering line consists of about 4000 ft of 4-in. aluminum pipe instead of the steel pipe used for the rest of the system. One-half of this aluminum line was left bare and the other half was wrapped in the usual way.

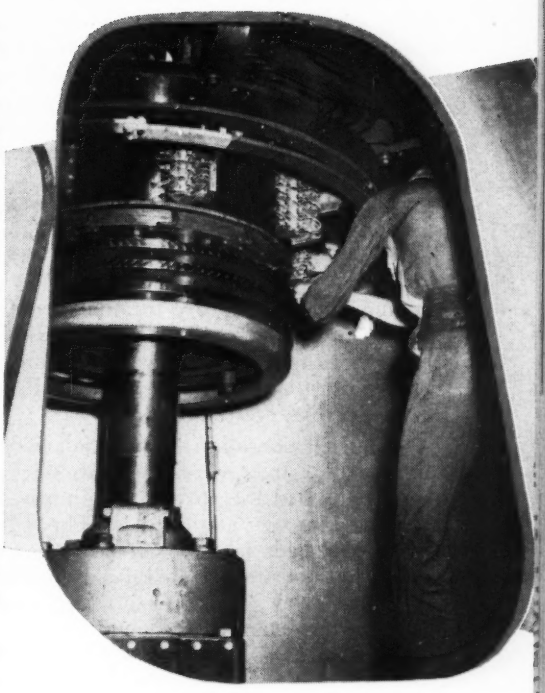
On-shore and off-shore lines terminate at the pressure-reducing station located on the reduction works site.

Natural gas is delivered to the works at a pressure of from 400 to 500 psi. This pressure is reduced in two stages to 60 lb. Two 8-in. gas lines connect each of the three power houses with the pressure reducing station. A regulator at each engine further reduces the intake pressure, and in actual operation, gas enters the engine at a pressure of about 6 lb.

Each engine consumes gas at a rate of 13,000 cu ft/hr under load. Normally, the plant will use more than 30 MMcf per day.

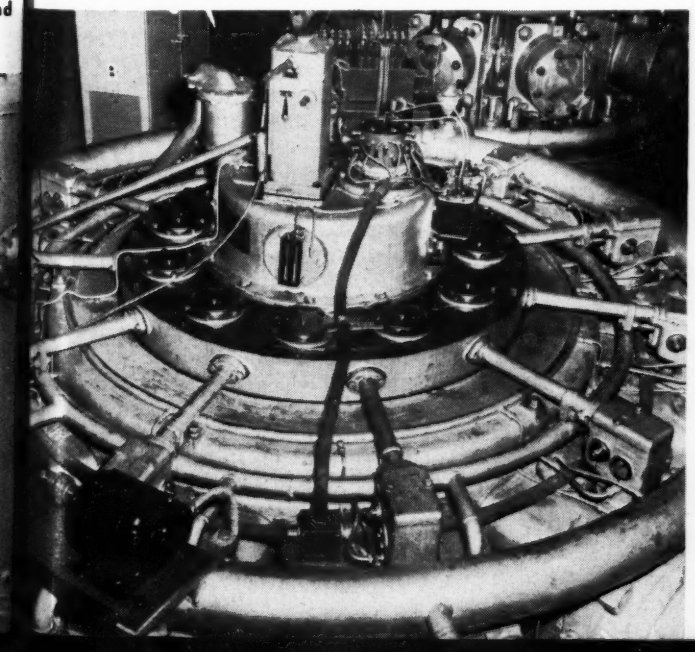
Nominal generating capacity of the power plant is 120,000 kw. Under normal operating conditions, the total output of the plant will be approximately 2,750,000 kw-hrs/day.

One hundred twenty engine-generator units convert the gas into elec-

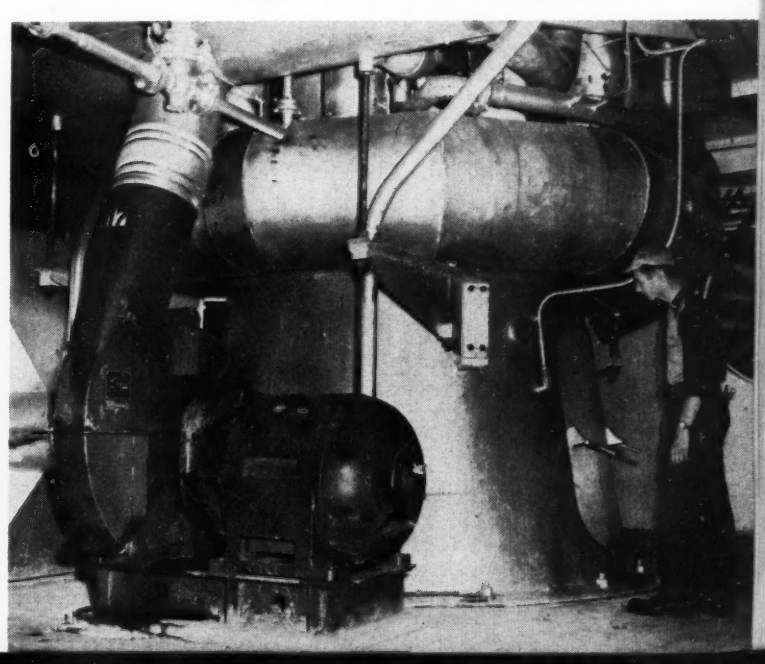


INSIDE AN ENGINE BASE such as is shown below, with 1000-kw, 667-volt d-c generator. Slip rings provide 24-cycle power for auxiliaries.

CLOSE-UP of one of the gas-driven engines, showing governor, distributor, lubricator, and gas valves.



STEEL ENGINE BASE which houses generator. Motor-driven scavenging air blower is shown in foreground.



trical energy. Forty units are housed in each of three engine rooms, one for each "pot line."*

The engines are a two-cycle, radial type, built by Nordberg Manufacturing Co. With slight modification, the engine can be adapted to gas, diesel fuel or dual-fuel operation.

The 11-cylinder engine has a 14-in. bore and 16-in. stroke. At Point Comfort, the engines are normally operated at 360 rpm, producing 1600 hp. They operate at a thermal efficiency of about 29 to 30%.

The crankshaft is set vertically with the crank at the top. The cylinders are bolted radially to a cast frame having a central hub which carries both the lower crankshaft main bearing bushing and also the thrust bearing which supports the load of the crankshaft. The heavy, bolted cover contains the upper crankshaft main bearing bushing. The governor, fuel pumps, mechanisms for gas operation and controls are located on this cover. Circular manifolds for scavenging and exhaust are located in the lower level of the engine room. Intake and exhaust are timed by the pistons uncovering ports in the cylinder walls, and no valves are required.

Balanced operation is accomplished by use of a master gear, a stationary gear bolted to the cover, two pinions, and rotating counterweights. The 11 connecting rods are attached to the master gear by means of knuckle pins mounted in bronze bushed bearings. The master gear gyrates instead of rotating. There is no master connecting rod, commonly associated with radial type engines.

Two systems of lubrication are used. Motor driven, multi-feed lubricators deliver oil to each cylinder for piston lubrication. A circulating, pressure system provides oil for all other parts requiring lubrication and also for piston cooling.

When on gas, the engine operates on reduced compression, with spark ignition. Natural gas is admitted by cage-mounted gas valves. The valves are operated by a cam on the crankshaft and are so located that gas is admitted into the path of incoming scavenging air. This assures thorough mixing and efficient use of the fuel. A valve inserted in the gas line and controlled by a governor varies the amount of gas delivered to the cylinders according to the load on the engine.

The electric generators, located in the lower level of the power houses, are joined to the engines by direct coupling. Each engine-generator unit, with its auxiliaries, operates independently. Forty generators were supplied by each of three manufacturers: Elliott Co., General Electric Co., and Westinghouse Electric Corp.

Each generator produces 1000 kw (d-c) at 667 volts and 125 kva (a-c) at 425 volts and 24 cycles. The a-c power is used for driving the engine auxiliaries. This eliminates the need for a common auxiliary power system and possibility of a total station interruption.

The generator is used as a motor in starting the engine.

Each engine-generator unit has its own control panel. Included is engine protective equipment, which causes the engine to shut off automatically for such reasons as low oil pressure, high water temperature, high exhaust temperature, overspeed, high generator temperature, or loss of auxiliary power.

In addition to unit control panels, each powerhouse has a master control room with recording and indicating equipment registering the operation of each of the 40 engines and generators. No unit can be shut off from this master control room, but it provides a central point from which the operation of 40 units can be observed.

Centrifugal-type scavenger air blowers, which provide air under pressure to the engine cylinders, are driven by a 100-hp motor. These blowers supply air at the rate of 7000 cu ft/min.

The axial-flow type, generator cooling air fan is driven by a 7½-hp motor. The fan supplies air at the rate of 12,000 cu ft/min. Along the wall behind each generator are the high speed generator switch gear, generator control, and starting equipment.

Combination oil and water engine coolers were built by Trane Co. Heat exchangers, all aluminum except for cast iron headers, are approximately 15 x 11½ x 3 ft in size. Alclad aluminum alloy 3S is used for both tubing and fin stock. The tubes are arranged in banks of three with the water tubes in front of the oil tubes.

The tubes and vertical fins are joined mechanically. Each exchanger consists of four sections, which are independent of one another except for connection to a common manifold. Individual tubes may be cleaned or cut out of the system without interfering with the operation of the whole exchanger.

An 84-in. diameter heat exchanger fan, having six adjustable blades, is driven by a 2-speed, 25-hp motor. Oil and water circulating pumps are driven by a common 15-hp motor.

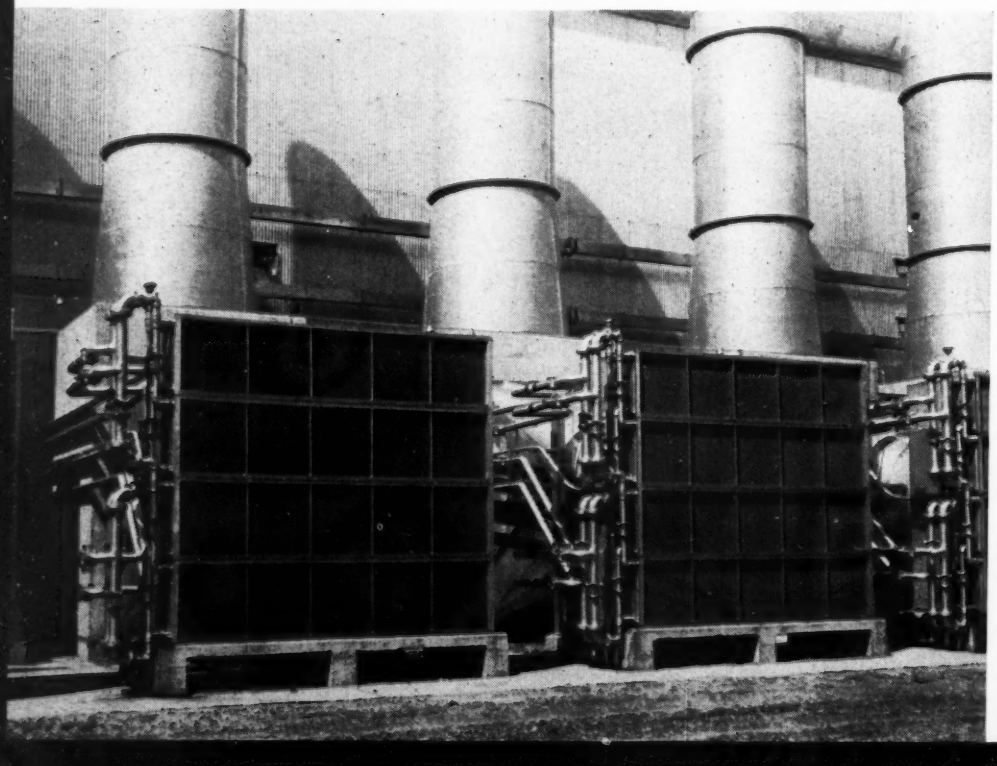
Each engine room has 40 building air washing units. These all-aluminum units have housings 14 x 5 x 5 ft in size. Each unit, containing 30 all-aluminum washer cells, has an air capacity of 35,000 cu ft/min. Water is sprayed through the unit at a rate of 125 gal/min.

Sixty-cycle, 4000-volt alternating current is produced by four 667-volt d-c motor-driven generator sets. This power is for general works use. There is also a 250-volt, 250 kw generator on each set which provides power for cranes throughout the works.

Each engine-generator unit has its own stack, which handles engine exhaust, generator cooling air, and the air from the heat exchanger. Stacks, having an overall height of 50 ft and 7½-ft diameter, were made from ⅛-in. aluminum sheet. The all-riveted stacks were fabricated on the job.

*A line of "pot rooms," or buildings in which aluminum is made. The pot line comprises a reduction unit in which electrolytic cells are arranged in a series.

HEAT EXCHANGERS for cooling engine water and lubricating oil. Exchangers, 15 ft high, are all aluminum except for headers.



Installation of Oval Vents

PCGA Prescribes Procedures For Eliminating 'Hot Walls'

EXCESSIVE heat, paint discoloration, and plaster cracks are conditions found in 2 x 4 in stud walls where the installation of oval vent pipe with a direct connection to a recessed heating appliance is made without due caution.

These conditions may be counteracted by installation methods developed by the heating division of the manufacturers section of the Pacific Coast Gas Assn. in carefully supervised tests.

In overcoming the difficulties found to be present in some installations, PCGA instituted a research into the problems by 23 of its manufacturer-members. The results of the study into the cause of hot walls led the researchers to the following conclusions:

The difficulties to be overcome lay in three possible situations: (1) where close proximity of the vent to the wall permits plaster keys to come in contact with the vent pipe; (2) where air circulation in the confined vent space is lacking; (3) where the direct connection is made within the wall itself.

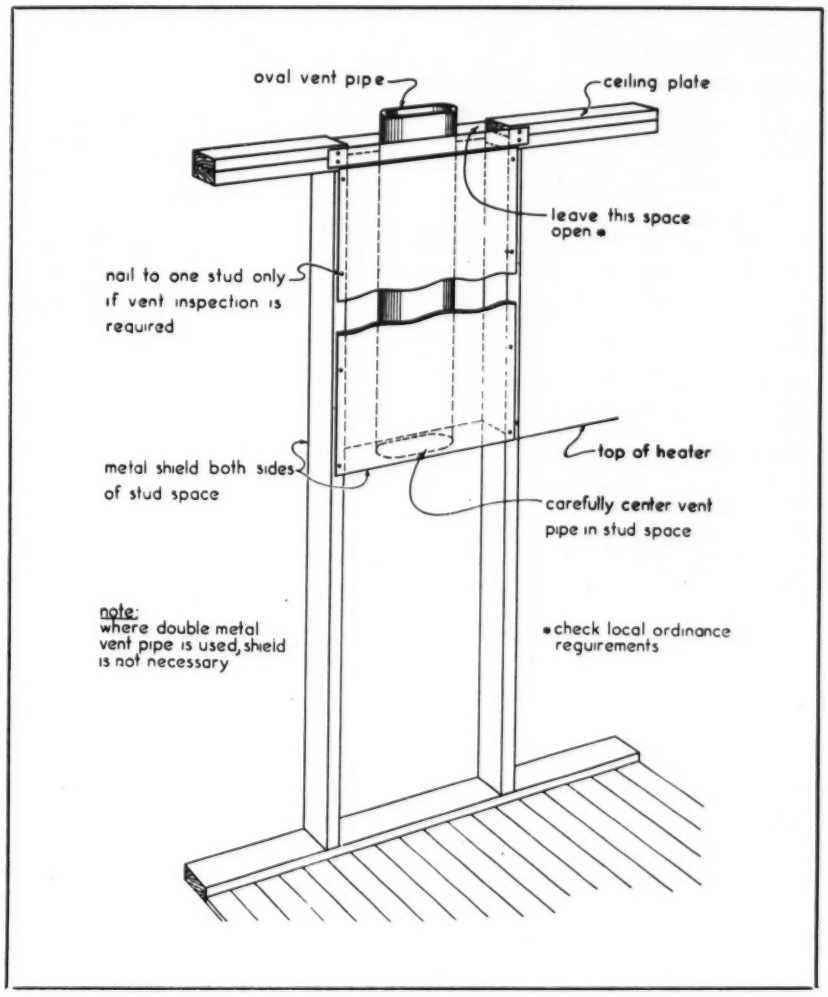
Recently published by the PCGA and endorsed by 23 manufacturer members, the recommended installation practices are:

1. Install single-wall composition vent pipe with galvanized iron or aluminum sheet as shielding over the vent space, as shown in the sketch.

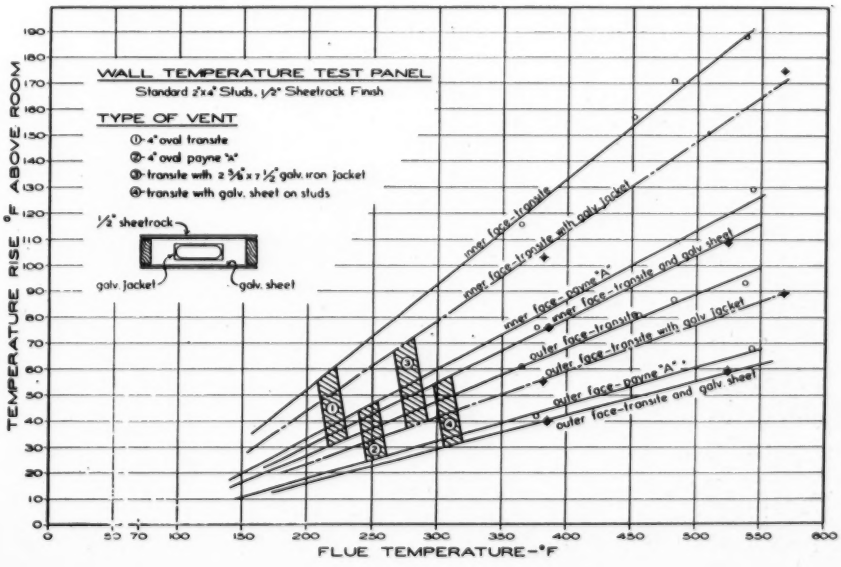
2. As an alternative, use double-walled metal vent pipe, which serves the same purpose as shielded composition vents.

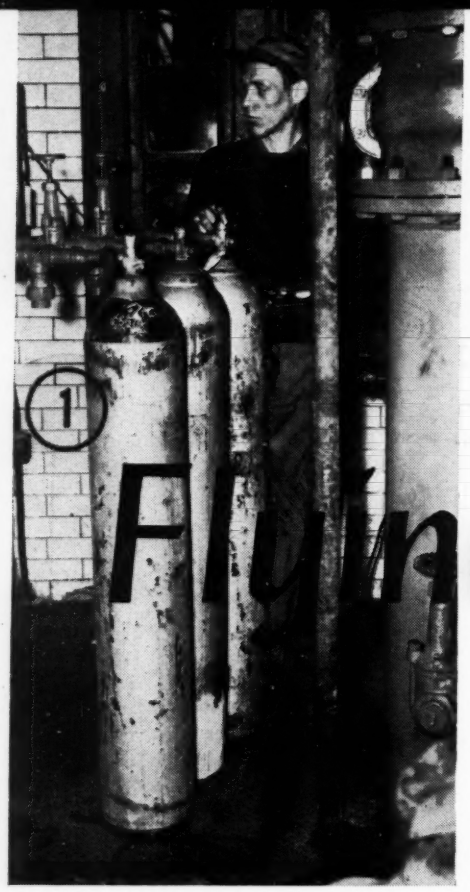
3. Leave the stud space open at the ceiling plate (as shown in the sketch) to allow air circulation. Always carefully center the vent in the stud space.

Tests indicate that metal shielding installed as recommended with single-wall composition vent pipe will reduce exterior wall temperatures by as much as 40%. The chart shows the results obtained in these tests.


oval vent pipe
ceiling plate
leave this space open *
nail to one stud only if vent inspection is required
top of heater
metal shield both sides of stud space
carefully center vent pipe in stud space
note: where double metal vent pipe is used, shield is not necessary
* check local ordinance requirements

RECOMMENDED installation for oval vent pipe connected to recessed heating appliances.





1. PRELIMINARY. Local plant workman takes the engine out of service and purges it at 6 a.m. in preparation for the flying squad's appearance at 8. At his purging task, workman maneuvers valve of CO_2 bottle, keeping his eyes on lines and gauges. Following cleaning, he will return to back-purge the engine to place it in readiness for resumption of service.

Flying Squad

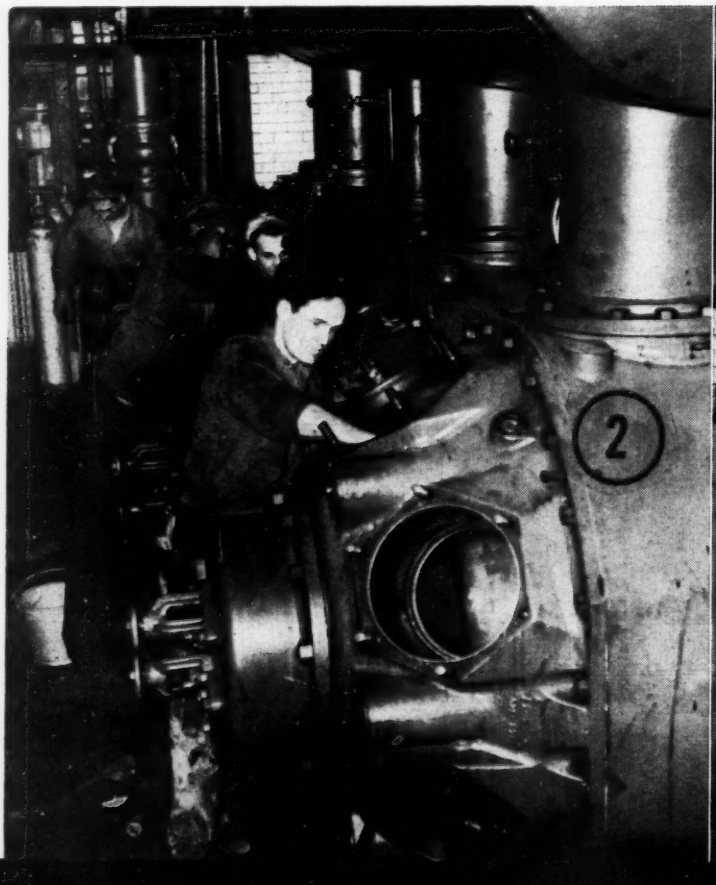
WHEN the Philadelphia Gas Works needs a compressor cleaned and overhauled, it calls into action its 14-man "flying squad" to do the job. Organized on a production-line basis, the squad carries out purging, valve changing, cleaning, and reassembly in a matter of six to seven hours.

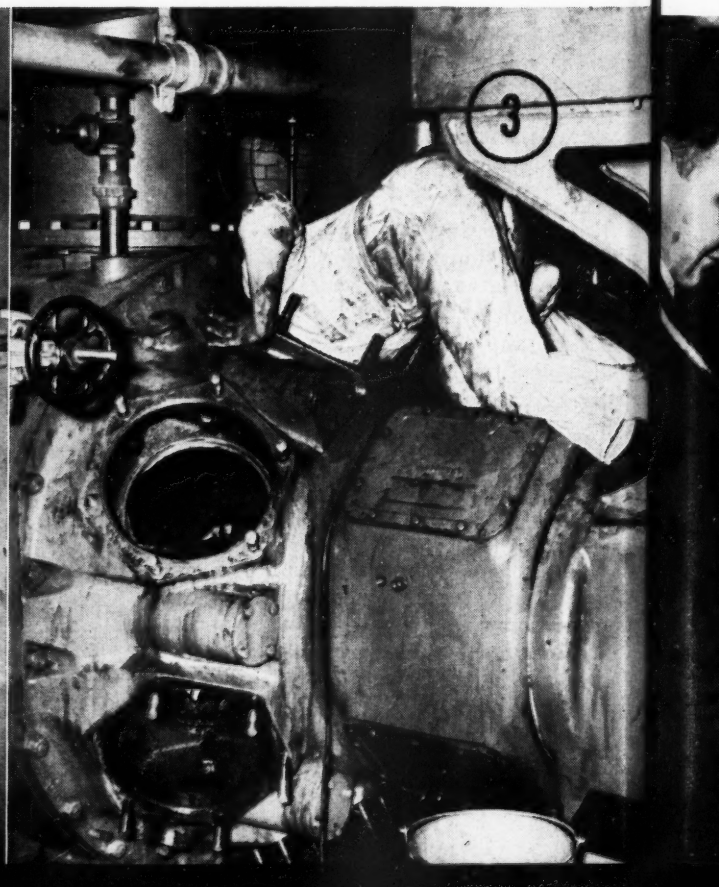
Close timing and good coordination are the keys to the success of the plan. Directed by John Antonich, assistant to the superintendent of gas storage and supply, the job is carefully thought out in advance. Long-range weather forecasts are studied, probable gas sendout is calculated, crews are readied for the task, and at the latest possible moment consistent with efficient operation the decision is made to act.

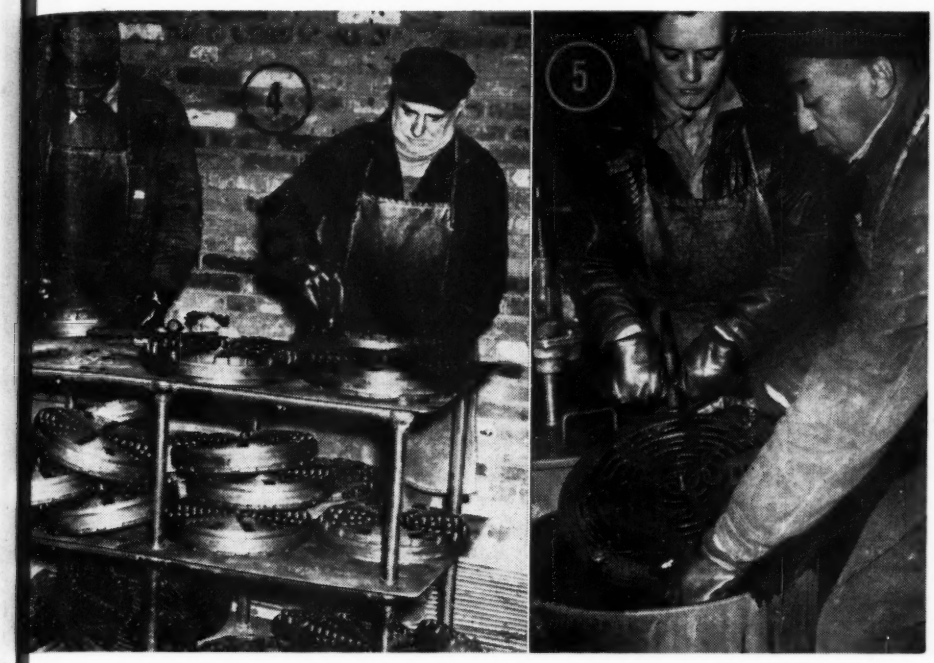
Since compressors must be cleaned after every 1500 hours of running, the 14 PGW engines must undergo this treatment about three times a year.

Photos courtesy the Philadelphia Gas Works *News*.

2, 3. UNDER WAY. Members of the squad swarm all over the equipment as the job starts. Cover plates are removed, after which valve chairs and valves are taken out for treatment. To speed this part of the job, tools have already been carefully checked and necessary replacement parts placed in a handy location.







4, 5. **CLEANUP.** Valves removed from the engines are carefully scraped, as shown in the above photo, after which they are dunked in a solvent bath. While one man steadies the valve, the other removes it from the bath, as shown at right. Since they are interchangeable, cleaned valves are stored away for use on a subsequent assignment. Having a spare set ready for replacement instead of waiting for the cleaning job to be completed speeds the entire operation.

6. **FITTING GASKET** into dry valve. Note that working space is small, eliminating chance that valve might slide off bench. All phases of the job are carefully planned, all steps fall into pre-arranged work pattern.

7. **VALVE HEAD AND SEATS.** After a careful cleaning, these parts are stored for use on the next job.

8. **LAST STEP.** Workmen replace the cover plate. The compressor is now ready for a purge, after which it will be put back into service. Workmen comprising the flying squad were recruited from regular production department crews, will now return to their regular duties until the next engine needs a cleanup.

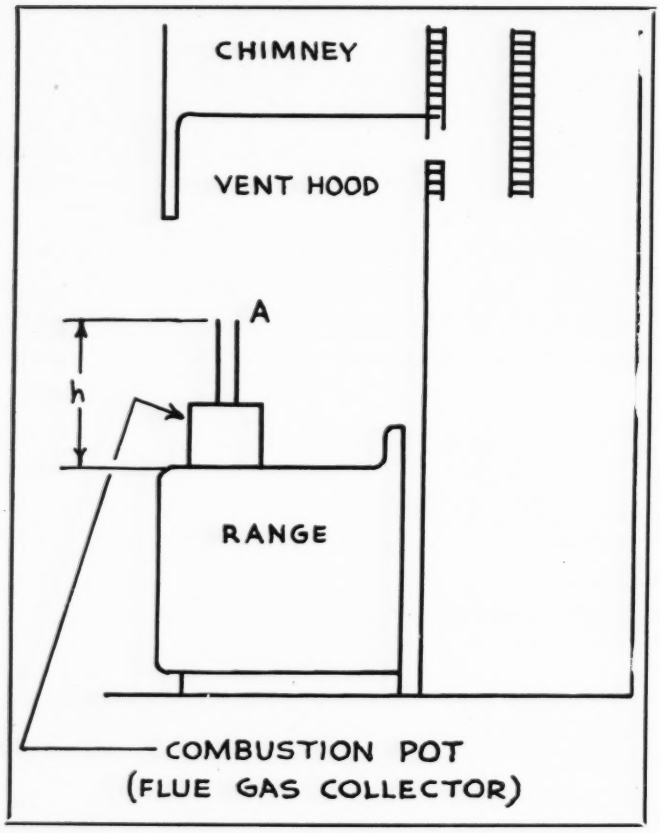


Fig. 1.

Overcoming Venting a S

A report on AGA-PAR progress in the research into methods of disposing products of combustion.

By Keith T. Davis

THE matter of proper handling of products of combustion is undisputably important but there are honest differences of opinion as to the exact nature of the problems which result. Some feel the major problem is that of convincing the public that all space heating and water heating equipment should be vented. Others feel that condensation and deterioration in flues and chimneys is the problem. Others apparently cry for help resigned to the belief that they are the victims of a venting problem should a pilot go out, should a burner suffer from extinction noise, should humidity condense on a window pane, should mother have a headache, should there be a damp spot on the wall or ceiling near the chimney, should the paint peel off the house, etc. Admittedly there are these possibilities, and, while they deserve discussion within our industry, such discussions or research work assignments should not be construed by the utilities or the public to be evidence that the progress of the gas industry is being hampered by lack of fundamental knowledge on venting.

If there is a basic problem in connection with venting, it is due to the lack of general understanding and uniformity of opinion as to its necessity versus its desirability, its complications versus its simplicity, its safety versus its hazards, its perfection versus its practicability. A review of venting on this basis involves not only technical but commercially competitive aspects, a review of the position of gas as compared with the practices, services rendered, and the installation conveniences which are standard with other fuels.

Gas has little to fear from coal and oil from the standpoint of convenient means for feeding fuel to the burner, reliable and simple fuel ignition, and uniform quiet combustion utilizing the minimum of mechanical devices. And when it comes to venting, there seems to be no basic reason that gas should labor under any special handicap, either real or imagined, as compared with the other fuels. It is true gas appliances utilize draft hoods where the others do not, but recall that the draft hood was only devised to achieve the competitive advantage of closer combustion control and better efficiency. If competitive fuel costs have changed the picture, perhaps the draft hood situation should be reanalyzed to see if its advantages outweigh those complications which purportedly result from its use. For if the use of barometric draft balancers on coal and oil jobs frees them from venting difficulties, the use of the same devices on gas equipment installations could produce equally satisfactory results insofar as venting is concerned.

Are Draft Hoods Necessary?

It is probable that elimination of draft hoods in favor of barometric balancers might recreate the old difficulties, such as greater pilot fuel consumption, a reduction in overall efficiency, the sporadic generation of monoxide, and occasional deposits of soot. Even though such combustion is universally accepted as normal for the other fuels, the gas industry obviously will not abandon the draft hood on the usual domestic appliances. It, therefore, becomes necessary to consider whether its use creates any markedly different venting situations than would exist were it omitted, and this analysis in turn requires understanding of the functions, design theory, and the limitations of draft hood devices. *The functions of a perfect draft hood are:*

1. To so stabilize the draft conditions within the appliance that a constant velocity and direction of flow of combustion products is achieved for any given input rate under varying conditions of blocked flue, up-draft tension or down-draft pressure.
2. To provide an upper relief opening for free venting of the concussion wave which results immediately on burner ignition.
3. To so collect the combustion products that all spent gases are conveyed outside the structure.

Obviously none of today's contemporary draft hoods meet all of these requirements. Some come closer than others but all permit some variation in combustion products as stack velocities increase, as different down-drafts are encountered, etc. Obviously, no draft hood will convey all flue products outdoors when the flue is blocked or when there is down-draft spillage.

An elementary type of draft hood is illustrated by the vent hood above a kitchen range. In *Fig. 1*, a "funnel-shaped" utensil has been placed over one of the burners so as to collect the products of combustion just as would the heat exchanger of a space heater or water heater. To further

Mr. Davis is chief engineer, Bryant Heater division, Affiliated Gas Equipment Inc., Cleveland. His paper was originally presented at the AGA domestic gas research and utilization conference, Cleveland, April 25th-26th.

Supply Problems

Part I of two parts

increase the simile, let's assume that any desired CO_2 can be obtained at the outlet (A) by baffling within this flue gas collector, or by varying the stack height (h) for any particular burner input. Under the conditions pictured, it is obvious that the first two functions of a draft hood are fulfilled. Under any conceivable range of up-draft, down-draft, or blocked flue conditions, the CO_2 at the outlet (A) will not be changed. However, we are not sure of 100% removal of vent products, even though the opening into the chimney (3 in.) is several times the area of outlet of the flue gas collector. By the time the theoretical volume of combustion products has drifted to the chimney, the initial volume may have mixed with and contaminated kitchen air equal to some thirty times that of the original, and, of course, the volume of this entire mixture must then enter the chimney if all the flue products are to be removed. Such excess dilution requires large flues for small inputs and results, during the winter, in removing from the building larger quantities of room temperature air than is desirable.

In addition to dilution problems, there are other functional requirements of draft hoods which may be evaluated in *Fig. 2*. For a constant flow rate through the inlet collar, dilution and spillage is great if baffles are at positions A and B, particularly if high velocity flue gas flow impinges on the baffle at position (A). With the large outlet collar, it is probable that less spillage will occur, but of course, excess air will be removed from the building. And with this same oversize outlet collar, the quantity of air during down-draft may be so great as to build up a pressure zone on the top of any appliance jacket just below the hood and so interfere with normal free venting from its heat exchanger.

AGA requirements on gas-designed equipments specify up-draft, down-draft, and blocked flue tests on the equipment submitted to the AGA laboratories. *Fig. 3* illustrates the problems involved in meeting all of these requirements. In the case of draft hood (A), the normally effective stack height of the heat exchanger (H_n) will not be changed by up-draft, down-draft, or blocked flue. However, in case (B), the effective height of the heat exchanger stack is reduced (H_{bf}) during periods of blocked flue. To some extent, this may cause a change in analysis of flue products, the degree being functional to the comparative heights of H_{bf} and H_n. In the case of draft hood (C), the possibility of dilution and spillage has been reduced, but the differences between H_n and H_{bf} have been increased to the point where AGA test failure can be predicted on blocked flue and probable failure anticipated on down-draft. A well designed draft hood usually has an inspirating effect under high velocity down-draft conditions which tends to draw combustion products from the appliance much as would a high velocity up-draft condition. AGA tests consequently are conducted at that down-draft velocity which creates no inspiration and establishes a test condition normally somewhat worse than blocked flue.

Installing Draft Hoods

The circumstances illustrated in *Fig. 3* explains the reason why installation instructions universally request that the original draft hood be installed per the appliance manufacturer's directions. Any change which interposes vent fittings or which changes the height between the burner and the draft hood inlet collar, or which shifts the spillage level of the draft hood skirt, voids the AGA approval of the appliance. Such changes may significantly alter the fine draft balance designed into the appliance and so vary the flue gas travel through the heat exchanger that the safety and efficiency of the unit may not comply with AGA requirements.

Because of the prevalent use of controls which automatically cycle burners on and off, it is desirable to establish full venting of flue products as soon as possible after the gas turn-on. The time required to eliminate spillage at the draft hood is determined by the speed necessary to establish the prime and up-draft flow in the vertical flue portion of the vent assembly. This is a function of the volume, the length and the pitch of the lateral connector pipe between the draft hood and the vertical flue for any given quantity of flue gases at any given temperature. It is also a function of draft hood design as illustrated in *Fig. 4*.

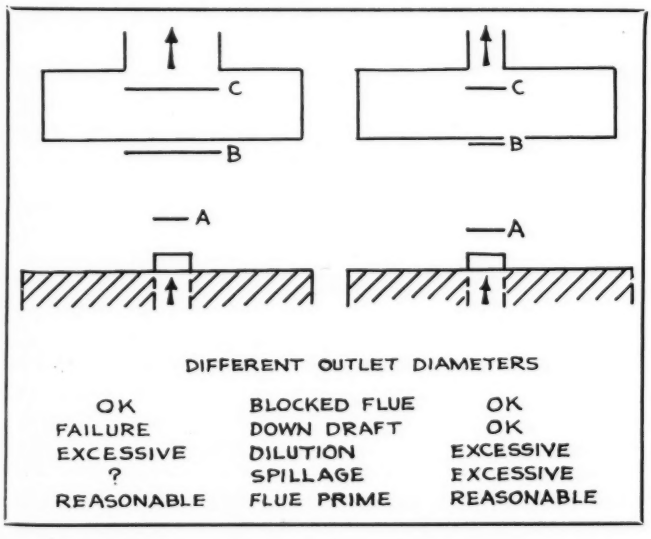


Fig. 2. Draft hoods of varying outlet diameters.

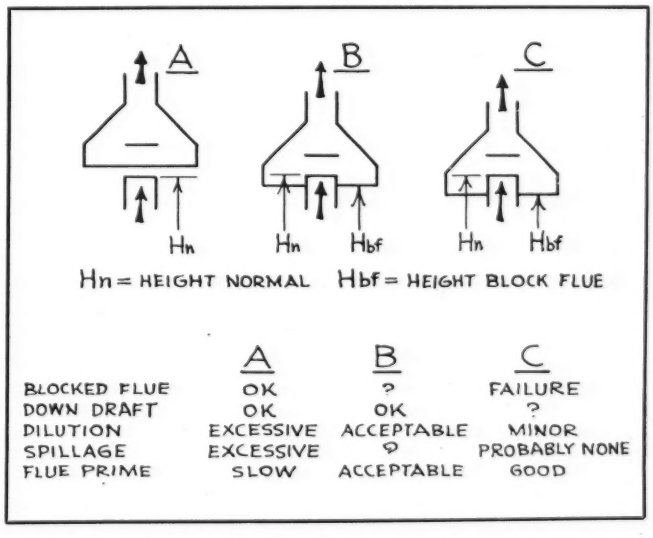
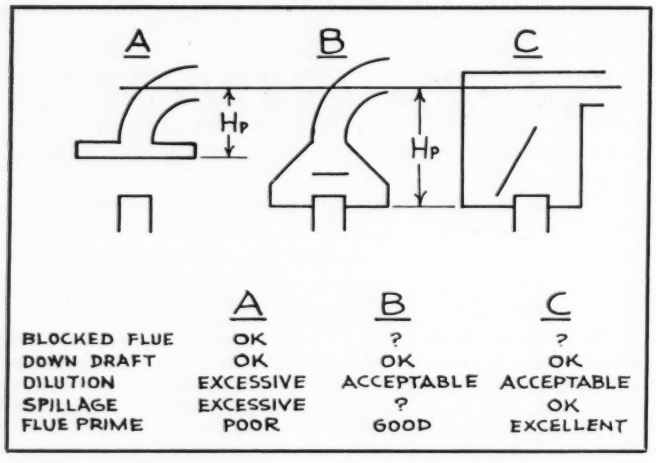


Fig. 3. Draft hoods of varying spillage levels.



	A	B	C
BLOCKED FLUE	OK	?	?
DOWN DRAFT	OK	OK	OK
DILUTION	EXCESSIVE	ACCEPTABLE	ACCEPTABLE
SPILLAGE	EXCESSIVE	?	OK
FLUE PRIME	POOR	GOOD	EXCELLENT

Fig. 4. (above) Draft hoods of varying internal stack effect.

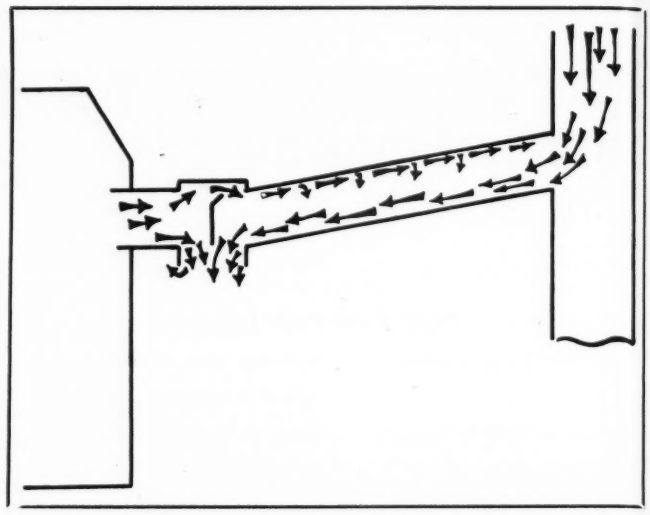


Fig. 5. (right) Counter flow circulation establishing stack prime.

The ability of a draft hood to accumulate energy to force flow through a horizontal connection is related to (H_p) the internal stack effect within a draft hood. For draft hood (A), the temperature of the flue products is low due to dilution and the internal stack effect of the draft hood is questionable as it obviously will be difficult to start flue gas flow into the elbow, spillage being the easiest flow path. In the case of (B and C), dilution has been decreased and stack effect increased with the greatest benefit to draft hood (C) for it has accumulated the most energy in advance of forcing the flue products to reform their shape and increase their velocity as they pass through the outlet collar into the horizontal vent connection.

While considerable research has been reported on the stack heights required to avoid draft hood spillage, the angle of approach of investigators has been different and the results difficult to correlate quantitatively. The AGA laboratories[1] work reported in 1943 by Milton Zare, which dealt only with spillage from water heater draft hoods under steady state conditions following the priming of the vertical stack, did indicate that for equal stack effects, temperature, Btu loadings, and vent sizes, different draft hoods have different spillage propensities, probably due partly to dilution and partly to energy losses resulting from friction and turbulence. This report further indicates that once flow was started, a 4- or 5-ft vertical stack would provide sufficient motive head to avoid spillage of a draft hood connected to 10 to 12 ft of horizontal vent pipe.

The Purdue Report No. 2 on venting[2] supplies information on the speed of priming of stacks and the stopping of spillage from draft hoods under varying conditions of lateral run pitch and lengths, stack heights, and ambient temperature exposures. Unfortunately most of these data are based on the investigation of a single 5-in. draft hood on one appliance fired at 50,000 Btu input and the turbulence and dilution characteristics of the hood were not reported, but it can be assumed that draft hood dilution did not take place during the period of spillage. The conclusions reached, that the length of horizontal run increases the period of spillage, and that grading the run upward from horizontal decreases the period of spillage, are helpful and logical. It is understandable that flow will be negligible until the energy of the heat bearing combustion gas mixture is available in the vertical flue-way where it can rise upward and start circulation within the stack.

1. Predicting Spillage Characteristics of Water Heater Draft Hoods, by Milton Zare, *American Gas Assn. Monthly*, April 1943.
2. Research in Venting Gas Heaters When No Chimney Connections Are Available, *Report No. 2*, Engineering Experiment Station, Research Ser. No. 2, Purdue University.

In visualizing the phenomenon of stack priming, it is well to start with the discouraging, yet reasonable situation of slight down-draft in the stack and lateral vent connector. This down-draft cannot be reversed until the hot gases enter the flue, yet to reach the flue, the combustion products must flow through the horizontal pipe against the movement of the down-draft flow. It is to establish this counterflow within the vent connector that it is so desirable to have stack effect within the draft hood and upward pitch in the lateral run to the flue. *Fig. 5* pictures a horizontal draft hood installation and illustrates how the heated gases try to travel toward the flue, their inducement being only the upward grading of the pipe, plus whatever stack effect is designed into the draft hood. The down-draft, if not too severe, is gradually restricted to the lower part of the pipe, and the heated gases eventually get into the vertical stack. Once around this corner, the up-draft buoyancy is less dissipated in frictional effect against confining surfaces and reversal of stack flow is probable.

The type of draft hood illustrated in *Fig. 5* has the advantage of providing free spillage of down-draft air with a minimum of mixing with the hot gases trying to enter the lateral. It does not have a great deal of built-in stack effect to recommend it, but height gained in the lateral due to its upward pitch is of compensating value.

The length of lateral runs must be evaluated in terms of the frictional effect of its upper surface, the distance over which the hot gases must creep. Perhaps the volume of the run may also be a function but it has been my experience that from the standpoint of quick priming, the ease of establishing counterflow in a large diameter lateral outweighs any disadvantage due to its volume. Particularly on conversion burner installations, the continued use of the original size of smoke pipe and a draft hood such as illustrated may result in quicker priming of the stack than if a smaller draft hood and vent pipe were installed.

Such counterflow is frequently encountered when attempting to establish circulation in an "on and off" fired warm air gravity heating system. Until the longer leaders are primed, it is not unusual to discover air flowing back toward the furnace in the bottom of these same leaders. In the case of second and third floor runs, it is customary for vertical warm air stacks to have a cross-sectional area only 70% of their connecting basement leader pipe area, research having proven little is gained by a bigger stack. This suggests that a flue gas stack would prime more rapidly if smaller than its lateral feeder, plausibly because the down-draft flow from the chimney would be less apt to completely fill the upper portion of the lateral.

To be concluded next month

OIL CONTACT SCRUBBERS

By P. W. McDONALD and
E. M. WOODS

Results of Performance Tests To Determine Efficiency, Capacity

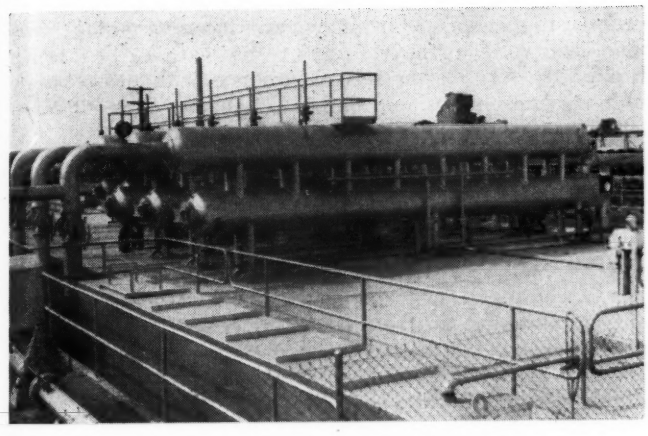


Fig. 1. View of horizontal scrubber installation.

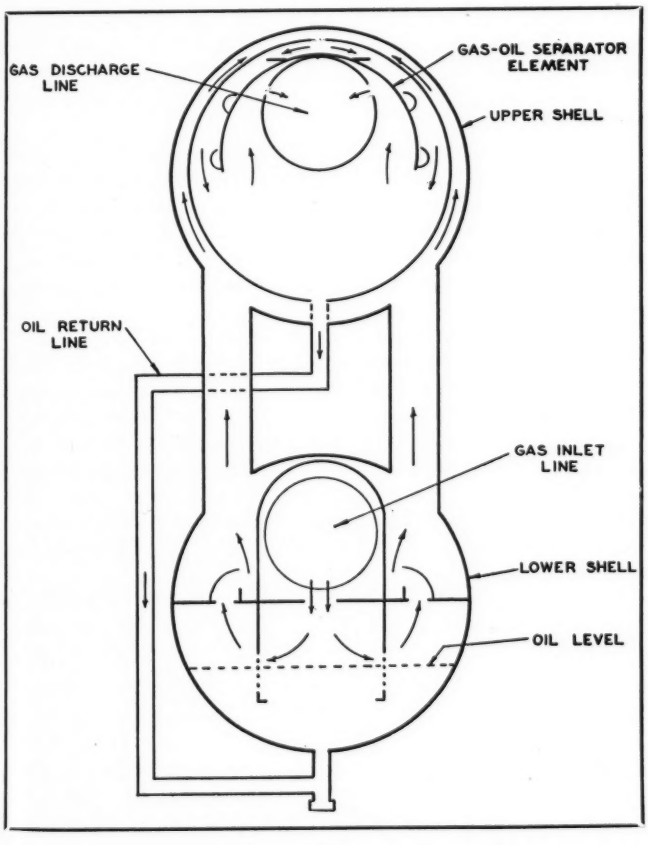


Fig. 2. Cross sectional view, horizontal scrubbers.

THE practice of using oil for the purpose of controlling or removing undesirable contaminants in gas is older than the natural gas industry. Since oil scrubbing was a common practice in the manufactured gas industry to remove napthalene and other gum forming contaminants, it was natural that this method should be tested as a means of controlling the dust problem that arose with the drying out of the mains during the changeover to natural gas. The use of oil in those early days can be grouped into two general methods. In the first method we find the gas being contacted with oil in towers or scrubbers. This method has come down to us today with very little change. The design of the scrubber and the quality of the oil undoubtedly have been improved but the basic principle remains the same.

The second general method was that of direct introduction of the oil into the pipelines. Usually the oil was introduced as mist or fog and called "oil fogging." The excess oil was removed in adjacent drips. Although oil fogging equipment underwent rather extensive development and experimental testing on the west coast during the late nineteen thirties, the practice is not in common use today.[1] The literature reveals a recent satisfactory application of this method in certain eastern cities where change-over to natural gas from manufactured gas was being made.[2]

Horizontal Scrubbers

The knowledge gained during the experimental work on oil fogging and the rapid movement in design and efficiency of drips are factors which can be detected in the development of another type of scrubber.

During the war years when steel plate was almost completely unavailable for non-combat construction, a method was developed for contacting the gas and oil in horizontal vessels comprised entirely of large diameter pipe sections, internally baffled with pipe segments. The gas and entrained oil were separated in adjacent drips or liquid knockout sections also constructed of materials common to the gas industry. An installation of this type was first put in operation in September, 1942.[3] The final step in the development of what we shall hereafter refer to as horizontal type scrubbers was the placing of the separator section immediately above the mixing section with oil return lines to form a complete and integral unit. The first unit of this type

[1]L. Oberseider, et al. PCGA proceedings, Vol. 29, pp. 86-99, 1938.
[2]AGA Monthly, Vol. 32, No. 1, pp. 14-19, Jan. 1950.
[3]F. Herr, *American Gas Journal*, V-158, N-4, April 1943.

Mr. McDonald is project engineer, Southern California Gas Co., Los Angeles; Mr. Woods is a member of the laboratory staff, Southern Counties Gas Co., Los Angeles. Their paper was originally presented before the PCGA technical services conference, San Diego, March 8-9.

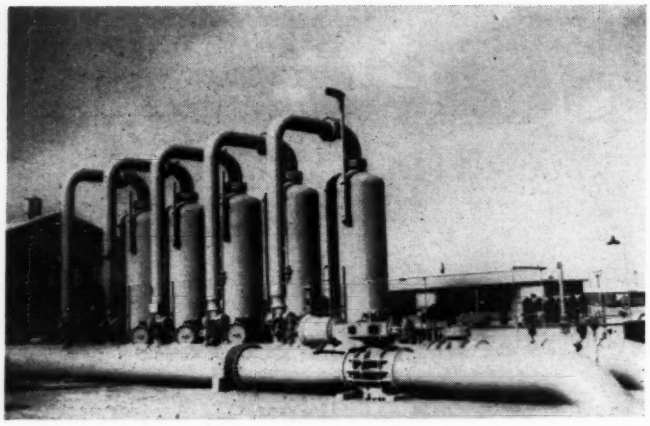


Fig. 3. View of vertical scrubber installation.

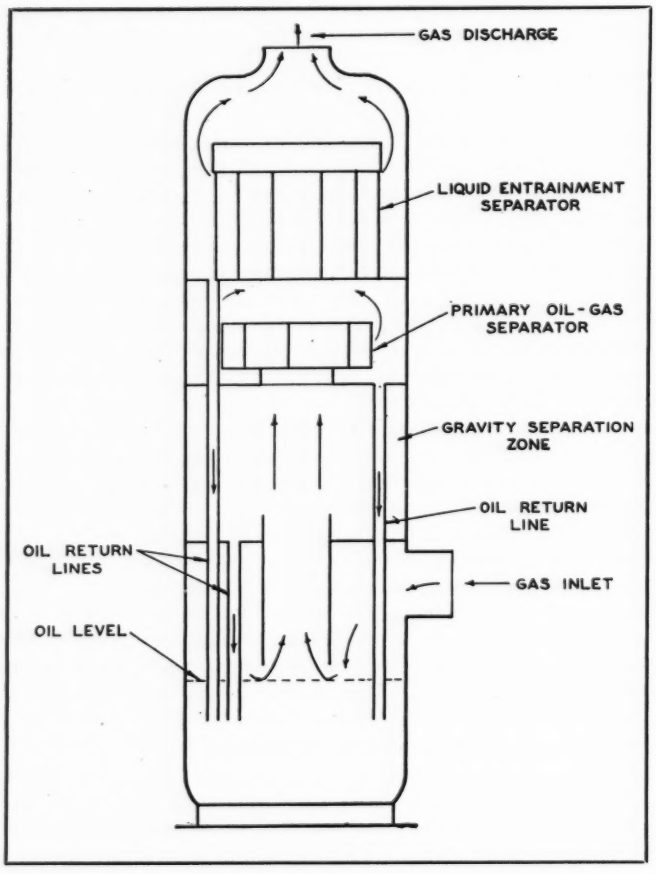


Fig. 4. Cross sectional view, vertical scrubber.

scrubber was put in operation in March, 1944.

The construction of the "Biggest Inch" pipeline and the inception of large volume gas deliveries from Texas to California made it desirable to provide large scrubbing capacity at two locations, the compressor station at Blythe, Calif., and the terminus of the transmission line at Santa Fe Springs. Consequently, three vertical type scrubbers were installed at Blythe and four horizontal type scrubbers were installed at Santa Fe Springs.

After the horizontal scrubbers had been in operation for a short time, it was suspected that the actual capacity of these scrubbers was somewhat less than the theoretical capacity. Rough checks on the oil loss at different gas rates and measurement of pressure drop indicated that this was the case. These four scrubbers were then re-rated at about 83% of the theoretical capacity. Subsequently, it was necessary to provide additional scrubber capacity to handle increased gas deliveries. In December 1948, three more of the horizontal type of scrubbers were installed at Santa Fe Springs and two more of the vertical type scrubbers were installed at Blythe. These additional scrubbers were of the same design as the originals except that the working length of each was increased 33% to provide greater capacity per unit.

Realizing that we could not assign a capacity rating to the horizontal scrubbers on the basis of theoretical calculations, we developed methods and conducted tests to determine the actual capacity and efficiency. The tests were also extended to include the vertical scrubbers at Blythe, so that a comparison of the two types could be obtained.

Perhaps a brief explanation should be made to clarify the terms "efficiency" and "capacity" as we are applying them to the operation of oil contact type dust scrubbers. Efficiency will be the term applied to the ability of the scrubber to remove dust from the gas. Capacity, on the other hand, will refer to the volume of gas that can be passed through the scrubber at a given pressure without excessive oil loss by mechanical entrainment. Capacity does not refer to the quantity of dust that can be removed.

Description of Scrubbers

The final installation at Santa Fe Springs consisted of seven horizontal scrubbers *(Fig. 1)*. All of these scrubbers were designed for a working pressure of 535 psig. Each consists of a 36-in. OD lower section, a 36-in. OD upper section, and measures 52 in. from center to center. Four have a working length of 25 ft 0 in. and three have a working length of 33 ft 4 in. The theoretical capacity of each of the original four is 75 MMcf per day at 250 psig and on the same basis the three larger ones should have a capacity of 117 MMcf per day at 250 psig operating pressure.

When the scrubber is in operation, the gas flows in one end of the lower 36-in. OD section and discharges from the opposite end of the upper 36-in. OD section. The lower shell contains the scrubber oil and the upper shell contains the gas-oil separator element. Drain lines between the two shells return the oil from the upper shell to the lower shell. A cross sectional view of this type of scrubber is shown in *Fig. 2.*

The scrubber installation at Blythe consists of five commercially available vertical type gas cleaners, each having an inside diameter of 60 in. and a height of 18 ft. A view of this installation is shown in *Fig. 3.* The vertical scrubbers were designed for a maximum working pressure of 800 psig and each has a rated capacity of 70 MMcf per day at 250 psig operating pressure.

The bottom of the vertical shell contains the oil reservoir. The gas enters from the side approximately five feet from the bottom and is contacted with the oil in a vertical mixing tube in the lower mid section. The gas then rises through a gravity separation zone, through a primary liquid gas separator, then through a mist extractor, and is discharged through the top of the scrubber. Drain lines inside the scrubber return the oil separated in the upper section to the reservoir. A cross sectional view of this type of scrubber is shown in *Fig. 4.*

The oil used in each of the two types of scrubbers is Standard Absorption Oil No. 2 which has the following properties:

Average molecular weight	183
Boiling range—initial	415°F
Boiling range—final	330°F
Gravity	37°-38° API at 60°F

Oil samples taken from the scrubbers at Blythe and at Santa Fe Springs had a gravity of approximately 39° API. It was concluded that an equilibrium condition had been attained at this gravity and this value was used in all oil loss calculations.

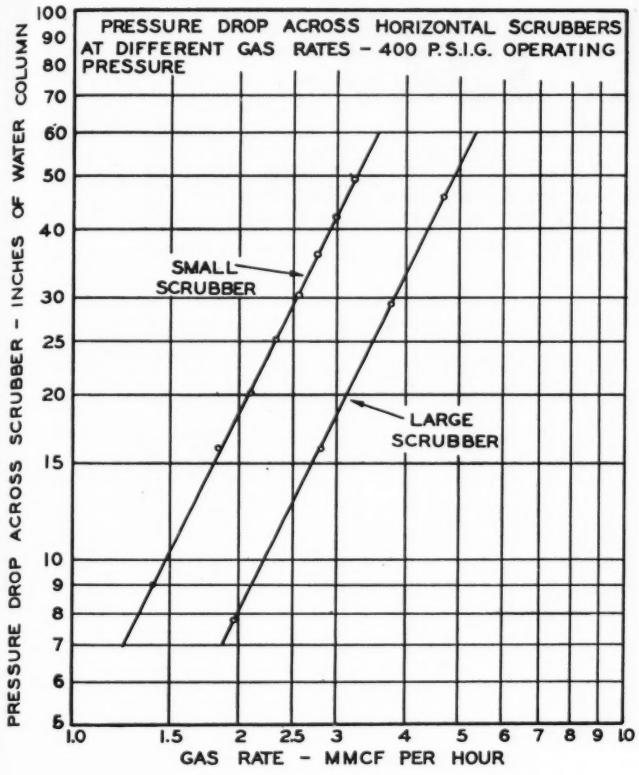

PRESSURE DROP ACROSS HORIZONTAL SCRUBBERS AT DIFFERENT GAS RATES - 400 P.S.I.G. OPERATING PRESSURE
SMALL SCRUBBER
LARGE SCRUBBER
PRESSURE DROP ACROSS SCRUBBER - INCHES OF WATER COLUMN
GAS RATE - MMCF PER HOUR

Fig. 5.

One criterion for determining the maximum capacity of the horizontal scrubbers is that the overall pressure drop across each unit must be less than the built-in differential. This built-in differential is the vertical distance between the oil level in the lower vessel and the bottom of the upper vessel, and amounts to approximately 41 in. when the oil level in the lower vessel is at the normal operating level.

For a scrubber oil having a gravity of 39° API or a specific gravity of 0.83 this built-in differential is equivalent to 34 in. of water column. If the overall pressure drop across the scrubber is equal to the built-in differential, oil accumulates in the upper vessel and cannot return to the lower vessel. If the overall pressure drop exceeds the built-in differential, oil will be displaced from the lower vessel into the upper vessel. When an excessive amount of oil is carried into the upper vessel, the gas-oil separator element becomes overloaded and the oil loss from the scrubber becomes excessive.

Tests to determine the overall pressure drop at different gas rates were conducted on one small scrubber and on one large scrubber, with the oil level in each unit at the normal operating level. Operating pressures could not be held constant during the tests and ranged from 440 psig to 465 psig. In order to convert the data to a common pressure basis, the gas rate for each pressure drop measurement was converted to an equivalent rate at 400 psig operating pressure from the relationship: Rate at 400 psig $= \sqrt{\frac{415}{P+15}}$ x Rate at operating pressure, P.

Pressure drops measured at different gas rates through the small and large horizontal scrubbers, with gas rates converted to equivalent rates at 400 psig operating pressure, have been plotted on logarithmic scales and are shown in *Fig. 5*. For a built-in differential of 34 in. of water column, the small scrubber has a maximum capacity of 2.7 MMcf per hour at 400 psig operating pressure and the large scrubber has a maximum capacity of 4.05 MMcf per hour at 4.05 MMcf per hour at 400 psig operating pressure. At this pressure the small scrubber has a rated capacity of 3.9 MMcf per hour (see *Fig. 6*) and the large scrubber has a rated capacity of 6.1 MMcf per hour (see *Fig. 7*). Therefore, on the basis of the built-in differential, the maximum capacity of the small horizontal scrubber is 2.7/3.9 x 100 = 69.3% of the rated capacity, and the maximum capacity of the large horizontal scrubber is 4.05/6.1 x 100 = 66.5% of the rated capacity.

Since the overall pressure drop across the vertical scrubbers did not appear to be such a critical factor in determining their capacity, the pressure drop across these scrubbers was not measured.

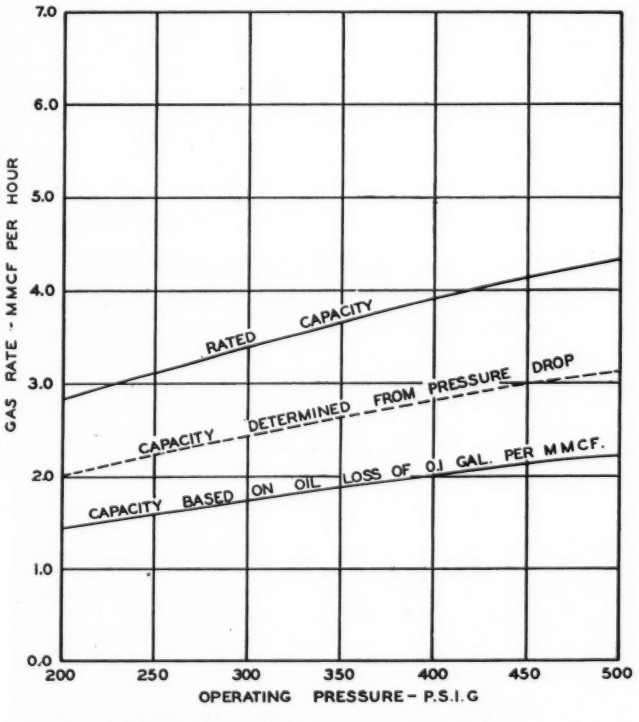

RATED CAPACITY
CAPACITY DETERMINED FROM PRESSURE DROP
CAPACITY BASED ON OIL LOSS OF 0.1 GAL. PER MMCF.
GAS RATE - MMCF PER HOUR
OPERATING PRESSURE - P.S.I.G.

Fig. 6. Capacity curves for each of the small horizontal scrubbers.

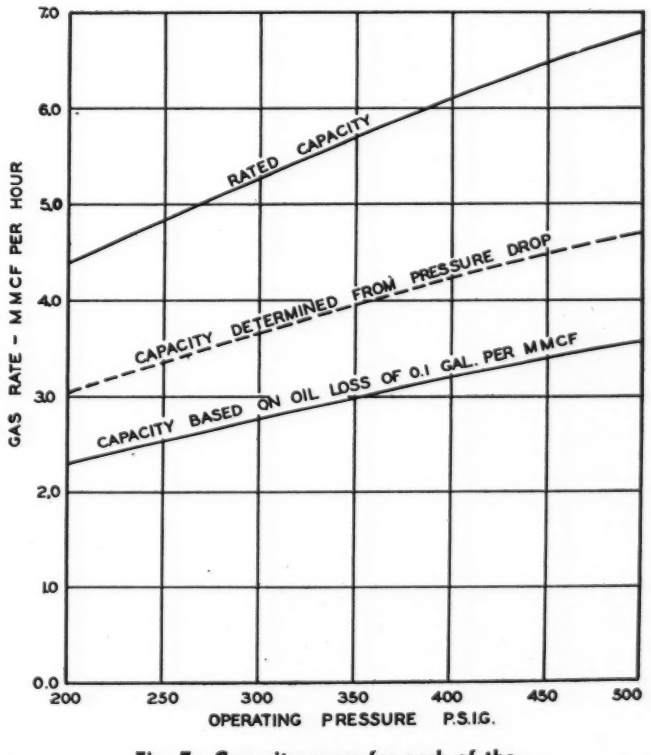

RATED CAPACITY
CAPACITY DETERMINED FROM PRESSURE DROP
CAPACITY BASED ON OIL LOSS OF 0.1 GAL. PER MMCF
GAS RATE - MMCF PER HOUR
OPERATING PRESSURE P.S.I.G.

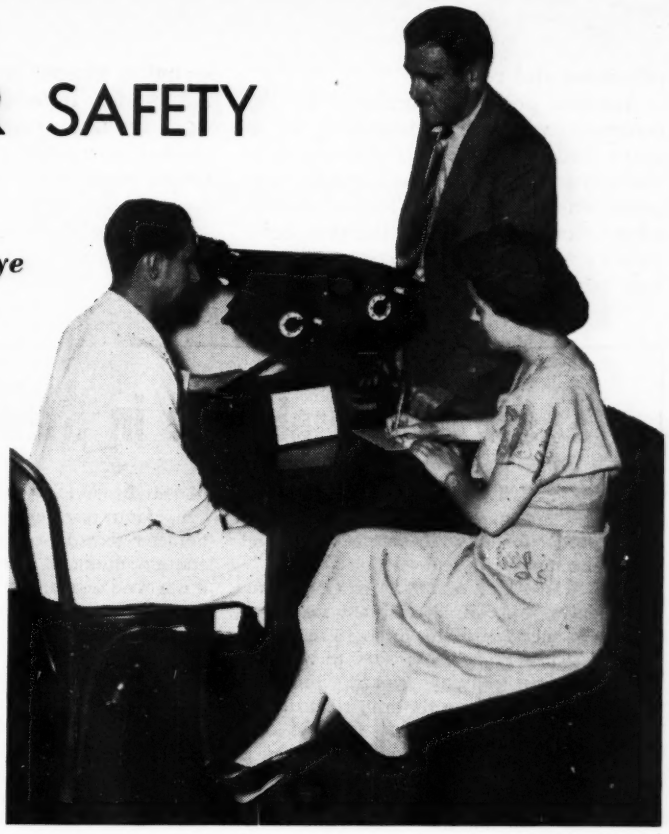
Fig. 7. Capacity curve for each of the large horizontal scrubbers.

Portland: 1925

ONE OF THE RARE occasions when members of the Pacific Coast Gas Assn. migrated to the Northwest for their annual convention was the association's 32nd, held just 25 years ago this month in Portland. A number of the 200 delegates and wives pictured in this group photograph, which was made on that occasion, are in Seattle this month for the 57th annual meeting.

VISUAL TESTING FOR SAFETY

How Portland Gas & Coke Co. discovered eye deficiencies and through corrective measures cut accidents is told by the company's safety engineer



At right, the author supervises a test being made with the "Ortho-Rater."

By GEORGE E. LEWIS

THERE is no other part of a safety program that can be so precisely and in measurable amounts give a clear picture of the savings and at the same time show a large return for the amount of money invested as can an occupational visual program. It has been and is continuing to be proven that a complete vision program including eye protection will not only meet but will also exceed all expectations. If any proof of this confidence is needed, one has only to look at the results of those industries that have inaugurated and carried out comprehensive occupational visual programs.

Exclusive

Approximately a year ago the management of our company initiated such a program. It was activated primarily because research proved that eye injuries were perhaps the biggest single controllable type of injury occurring within our operation, and experience showed that a compulsory type of eye protection program would be difficult to effect without some other form of service and accompanying benefits. It became increasingly apparent that a protection program alone would be only partially effective, because of the attitude of all people whose occupation required some form of protective eye wear, the type of eye wear provided, and the manner in which it was issued. This likewise applied because of the attitude of supervisors who, regardless of regulations, often sympathized with members of the organization and failed to set an example.

In order to take away the sting of a compulsory program for eye protection and to overcome the normal objections which would be raised to the wearing of protective eye wear, the management of this company decided to offer in addition as complete a visual program as it was possible for an industry to offer. It therefore subscribed to the service offered by the Bausch & Lomb Optical Co., which included the resources of that company as well as those of Purdue university. It provided for the training of responsible personnel in the administration of the program and the testing of all those within the organization who, on a voluntary basis, desired such a service. The company inaugurated an extensive educational program among all the members of its organization to acquaint them with what the service entailed and exactly how they as individuals would benefit, as well as the manner in which the company would be helped.

The testing device used, known as the Ortho-Rater, has been designed to check 12 of the most important visual skills needed for normal occupational use. As a result of individual testing, job visual profiles as well as individual profiles were set up to determine the visual adequacy of each person to perform his job efficiently and safely. In those cases where deficiencies are observed, that information is confidentially given to the individual with the recommendation that he seek professional care from any doctor of his choice so that everything possible may be done to improve or safeguard his vision.

Now that the initial testing period has been completed and all members of the organization have had the opportunity to take advantage of the free test, we find that at no time did any individual feel that something was being imposed upon him. Nor did anyone refuse to take the test. Rather, it was felt that this was one of the finest individual benefit services ever offered by the company. In most departments we feel sure that those individuals found visually inadequate for their occupations took advantage of the recommendation and privately sought out professional eye care. In one department in particular, with 450 employees, records to date show that 85% of those found deficient took advantage of the company's offer of assistance and did get professional care from the doctor of their choice. This department is the plant, or manufacturing division, wherein gas and allied petroleum products are

VISUAL ANALYSIS DATA

	Percent of Total*
Males	88.1%
Females	11.9%
Those over 40 years of age	45.9%
Males needing correction	33.1%
Females needing correction	30.7%
Those wearing correction when tested	49.0%
Those not wearing correction but needing examination	19.9%
Those deficient under age 40	15.9%
Those deficient over age 40	52.9%
Lacking adequate depth perception	21.9%
Males lacking adequate depth perception	21.2%
Females lacking adequate depth perception	27.0%
Lacking adequate color discrimination	9.3%
Males lacking adequate color discrimination	9.4%
Females lacking adequate color discrimination	8.7%
Lacking vision in one eye	4.0%
Needing professional care	32.9%

*Figures based on 100% coverage.

processed and refined.

Another policy inaugurated by the company, which is outstanding in its scope and which contributed much to the success of the over-all vision program, was the regulation that in all jobs where there is a hazard to the eyes, compulsory wearing of protective eye wear was required either of plano or prescription glasses according to individual needs. In addition, for all those who, by test or professional opinion, needed corrective eye wear, arrangements were made whereby the entire cost of the first pair of prescription safety glasses, including the cost of refraction, was paid by the company. All others who needed or desired prescription safety glasses obtained them at cost and in some cases a portion was subsidized by the company.

As a result of the testing, some very interesting visual data were accumulated (see *Table 1*). Analysis of these data shows that in comparison with other industries, some of the percentages are lower than average. This may be accounted for by the fact that in our safety program we have for several years stressed the importance of good vision in our occupations and have urged proper professional attention where necessary.

Cost, Results

Any such program must be justified on the basis of economy to be practical. It was our experience that the cost of introducing a complete occupational vision program for the first year was approximately 75% of the total costs of losses we were suffering as a result of eye injuries. Since the inception of the program, frequency of eye injuries has been reduced approximately 75% and time lost has been cut 50%. It therefore appears that the original cost would be amortized easily within the first year of the program, based on eye injuries alone. Any savings made from other types of occupational injuries which may have been prevented will show on the profit side of the ledger.

During the first five months following the introduction of the occupational vision program, as compared to the same period of the previous year, frequency of over-all injuries was reduced by 37.2% from the same period of the previous year, and by the same token the severity rate was reduced by 57% for the period.

It is certainly not the intent of the company to intimate that this entire reduction can be credited to the vision program, but it is significant that the reduction curve began shortly after the completion of the initial phases of the visual program. Naturally, the company has been carrying on numerous other activities in its over-all safety organization, but we cannot help feeling that a safety consciousness created by the wearing of safety glasses has had a tremendous psychological value.

Certainly we do not need to be reminded about the "high cost of living," but it is not fully realized that most of these eye costs are due to accidents. So far it has been our experience that a complete vision and eye protection program not only prevents eye injuries, but also, by correcting defective vision, lowers the rate for all accidents. In total, it is an effective method of reducing operating costs, of improving morale, of lessening fatigue, and of reducing absenteeism, all of which are important factors in production.

Gas Plays Dual Role in Steel Plant

NATURAL gas is depended on for two important tasks in the efficient production of stainless steel strip and sheet at Washington, Pa.

The Washington Steel Corp. produces "MicroRold" stainless steel strip and sheets in widths up to 36 in. and in a gauge range from .004 to .078 in. Nominal capacity is 1200 tons per month, based on the cold reduction to 24-gauge of hot-rolled stainless steel strip purchased from outside sources.

A 39-in., cluster-type Sendzimir cold-rolling reversing mill rolls the stainless steel strip to minute tolerances with extremely close control of gauge throughout width and length. The mill has a maximum speed of 400 ft per minute.

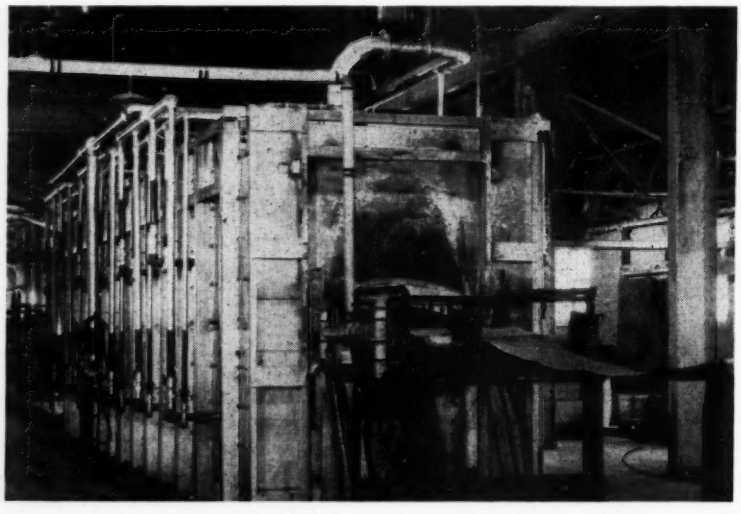
Natural gas, supplied by The Manufacturers Light & Heat Co., is the selected fuel for heat treatment. Annealing of the strip is accomplished either before, after, or as an intermediate step in the rolling process.

Annealing equipment at Washington Steel consists of a 40-ft catenary-type continuous furnace. Strip in motion through the furnace is supported by rolls at furnace entrance and exit. The furnace is direct-fired through its sidewalls, above and below the strip. Multiple low pressure proportioning burners are used. Such burners provide combustion atmosphere control. Fuel input and temperature are regulated by a potentiometer recorder-controller system operating automatic valves. This furnace is operated in a temperature range from 1950°F to 2125°F, depending on the gauge or speed of the strip.

Natural gas is also used in the descaling process. The stainless steel strip moves directly from heat treatment to pickling. Scale removal equipment consists of two 40-ft tanks and one 20-ft tank allowing either electrolytic or acid pickling. Heat for the pickling solutions is furnished by steam from a 50-hp vertical tube gas-fired boiler. This boiler, equipped with automatic pressure and safety controls, is fired by proportioning type burners.

According to one Washington Steel official, the flexibility of gas for obtaining varied, predetermined combustion atmosphere, with the resultant control of scale characteristics, is particularly advantageous in their processing.

The fuel requirements of the process, with natural gas, when operating 18 turns a week are 3680 cu ft of 1050-Btu gas per ton processed. Gas is not measured to individual units. It is estimated, however, that 3100 cu ft of gas are required for annealing and 580 cu ft for processing steam.



Exit end of 40-ft furnace, showing natural gas and air lines connected to low-pressure proportioning type burners at the sidewalls. Successive coils of strip are fed in at far end. Pay-off pit, hidden by furnace, gives space for slack and time to weld the feed of a new coil without changing speed.

Payne Spacesaver fits into space too small for others

How Payne's complete line enables the Payneheat dealer to provide the right unit, whatever the need

SUPPOSE the prospect requires a heating unit that must fit into extra small space. Can *you* sell him?

The *Payneheat dealer can,* because the Spacesaver is specially designed to meet this need.

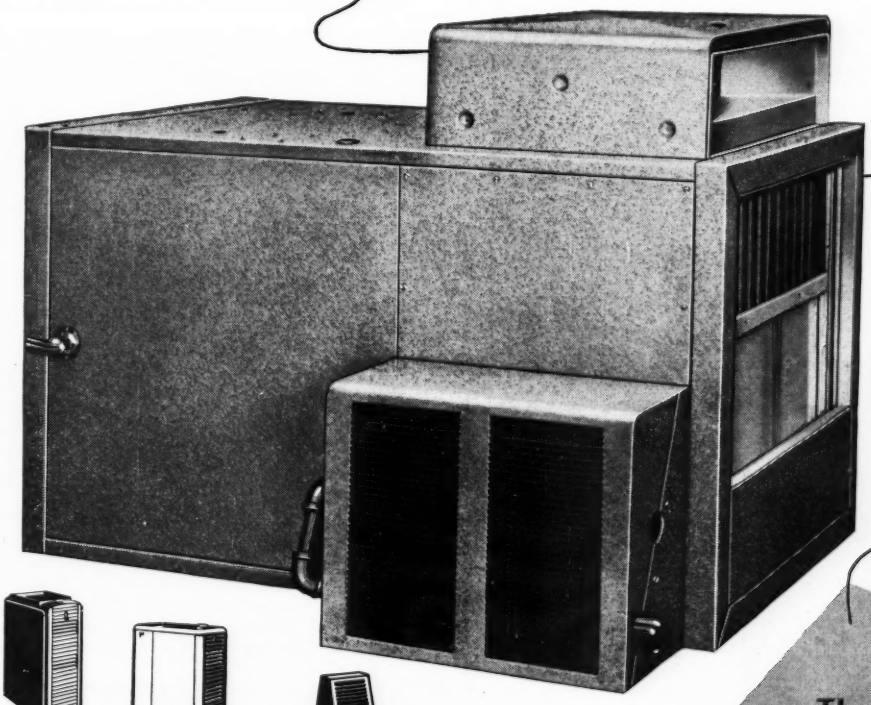
The Spacesaver is a *forced air* central heating unit for installation in attic, utility room, on service porch or under the floor. Or from ceiling, in commercial and industrial applications.

Horizontal in design, the Spacesaver occupies one-half to two-thirds the space required for most competitive units. Automatic, of course.

Soundly engineered, precision-built to Payne's exacting standards, which means the kind of performance that makes every user a Payne booster.

With Payne's complete line, the Payneheat dealer can always deliver the *right* unit to fit the buyer's needs . . . and budget.

The facts about the Payne dealership are worth knowing. They're yours for the asking—PAYNE FURNACE DIVISION, Affiliated Gas Equipment, Inc., Monrovia, Calif.



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Sentry

Zoneair

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Gravity

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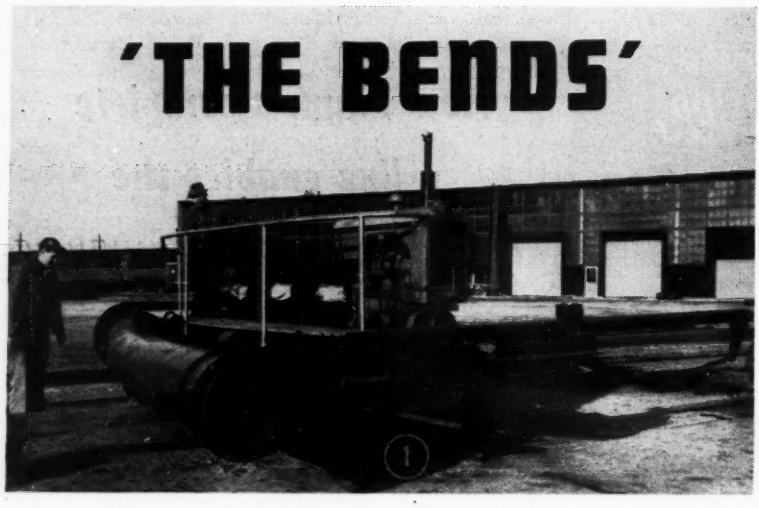
There's a Payne unit to fit every heating need and budget

'THE BENDS'

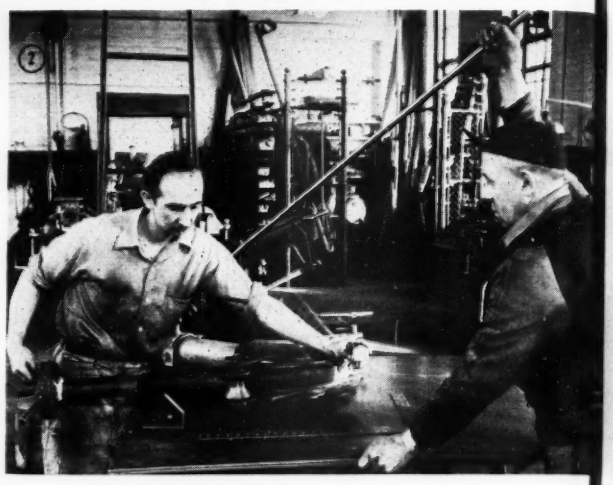


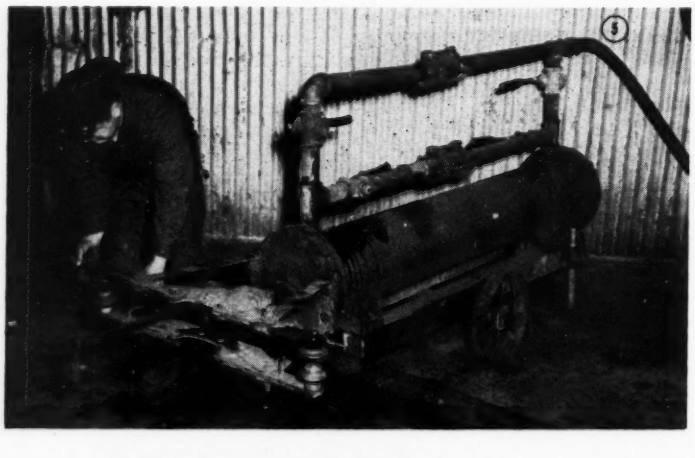
THE science of pipe-bending—particularly the cold bending of large-diameter sections—has made rapid strides in recent years. The East Ohio Gas Co., Cleveland, now utilizes a number of machines, some of them fabricated in its own shops, to perform this operation. Shown on this page are a few of the methods the company employs for handling pipe from fractional sizes to "big inch" diameters.

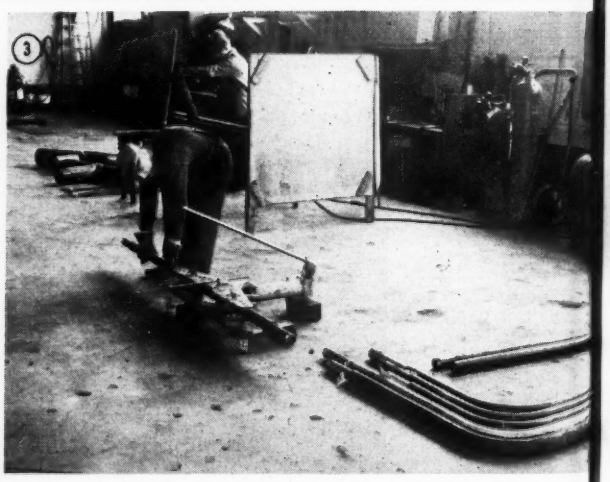
Courtesy *The East Ohio News.*

1. The company's newest bending machine produces a 10° bend in 20-in. pipe. Bending shoe and framework were bought for use on a job in 1943, mounted on a sled for easy transport and utilizing power-type tractors for the physical task of bending. Device was later mechanized by the application of a 37-hp engine with two transmissions, one geared as low as 40 rpm. Winch was added to apply pulling power in the operation.

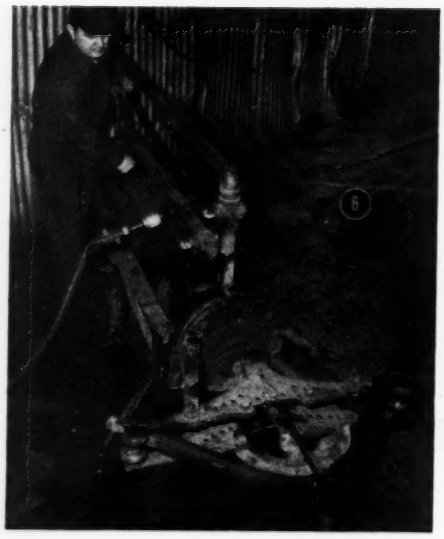
2. Hydraulic machine produces a 90° bend in an industrial field orifice run. While workman at left measures with tape the distance between orifice flange and center of the bend, his companion operates the jack handle to build up bending pressure.







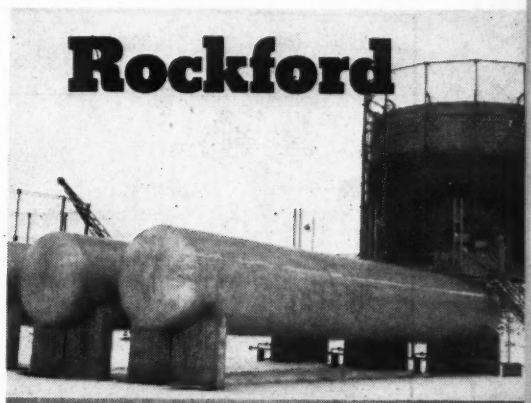
3, 4. Making bends within bends for service line installation in basementless homes, where it is current practice to encase the line in a larger pipe from an outside point through the building wall and the floor. In the first photo, two sections, one inside the other, are shown being placed in the machine. Second photograph shows the two full-formed bends wrought by the machine.

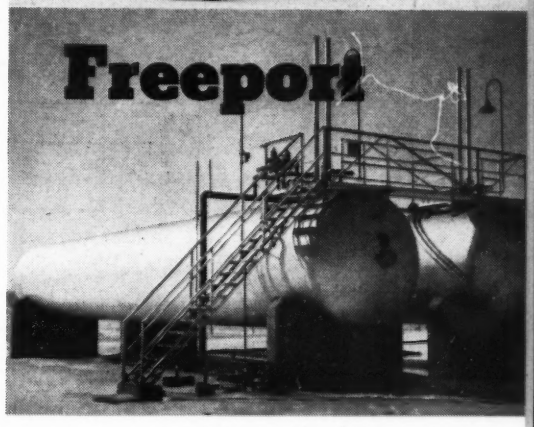


5, 6. The hydraulic cylinder on the machine shown in these photos was originally part of a lift used to hoist 500-lb hoppers of coke at East Ohio's old manufactured gas plant. High water pressures prevailing in the plant location—more than 100 psi—enable the harnessing of water as a power source. A pull as high as 24 tons has been exerted with pressures of 150 psi. The force is transmitted through the rubber hose shown, and pressure is controlled by stopcocks which apply pressure to the cylinder, which has a reversible thrust. After the bend is made, the pressure is reversed and tension on the bending shoe is relieved.

Propane-Air Peak-Shave Plants Stand Guard for Central Illinois

By R. W. STAFFORD,
J. H. ERWIN,
and H. W. GUSTAFSON





THIS ARTICLE DESCRIBES what a utility should require of an LP-Gas standby plant design to meet peak demands. Central Illinois Electric & Gas Co. has two propane-air plants at Freeport and Rockford (above). Rockford plant has three 30,000-gal. storage tanks; Freeport installation has two 30,000-gal. tanks—and both plants have provisions in design for greatly increasing capacities.

CENTRAL Illinois Electric & Gas Co. supplies Rockford and Freeport with natural gas obtained from Natural Gas Pipe Line Co. of America through an 8-in. line from Fairdale, Ill., a distance of 12 miles. This line carries gas at pressures from 500 to 700 psig to the town border station at Rockford where it is metered and the pressure reduced to 125 psig, thence to the Avon street plant where the pressure is further reduced to approximately 15 psig, to feed the intermediate belt line system, and to 7-in. water column to feed the low pressure distribution system. The dry gas is humidified and oil-fogged as it enters the Rockford distribution system.

The Changeover

Following complete conversion of Rockford from manufactured to natural gas in 1946, the coke ovens were dismantled and two standard 9-ft water gas sets were converted to production of high-Btu oil gas for peak shaving and emergency requirements in the event of pipeline difficulties. The storage holder capacity at Rockford is 3.4 MMcf, sufficient for approximately 8 hours under peak sendout conditions.

A 6-in. line approximately 28 miles long also carries natural gas from Rockford at 100 psig to Freeport. Here, at the town border regulator station, the pressure is reduced to 10 to 25 psig, whence the gas goes into the gas plant and to district regulators which feed the distribution system at 6-in. water column. Freeport storage holder capacity is 750 Mcf, sufficient on peak days for approximately 12 hours supply. After the old water gas plant at Freeport was abandoned, no standby facilities were available for production of emergency or peak shaving requirements.

The Problem

The length of time required to bring the water gas sets into operation and producing high Btu oil gas of approximately 1000 Btu per cu ft, the high labor cost attendant to this operation, and other miscellaneous factors influenced the management of Central Illinois to investigate the economics of peak shaving with LP-Gas air mixtures. Certain requirements were to be met as regards flexibility of operation; in rate of sendout, Btu value, ratio with base gas sendout, and complete substitution for base gas in the event of a tranmission line break near Rockford, during the time that the water gas sets could be brought into production.

This problem was studied by Stone & Webster Service Corp. and, with the assistance of the Philgas industrial-utility section of Phillips Petroleum Co., recommendations were made on propane-air plants to serve the needs of Rockford and Freeport. Consideration was given to the following points in establishing fundamental specifications:

1. Since natural gas is purchased on a schedule involving maximum day demand charges, these facilities would be used to keep the demand charge to a minimum.
2. While performance on the part of the transmission line company has been excellent, it was recognized that conditions might arise which would make it impossible for it to deliver all the natural gas allocated to the customer. Propane air would be relied upon to supplement such reduced deliveries of natural gas.
3. In the event of complete failure of natural gas for short periods, the peak shaving plant would have to carry the entire load.
4. Although limitations were placed on domestic space heating in 1946, this load has increased, resulting in a high peak demand during unusually severe weather.
5. The propane-air peak shaving facilities only would be used during extremely severe weather forecast for short durations, reserving the operation of high-Btu oil gas facilities for severe weather conditions of protracted length, or pipeline failure. This would result in greater economy since the propane air facilities would be designed for use on short notice and for brief intervals of time.

Discussions of these considerations between representatives of the utility, Stone & Webster Service Corp. and

The authors are, respectively, president of the R. W. Stafford Co., Chicago; gas superintendent, Central Illinois Electric & Gas Co., Rockford; and engineer for Phillips Petroleum Co., at Chicago.

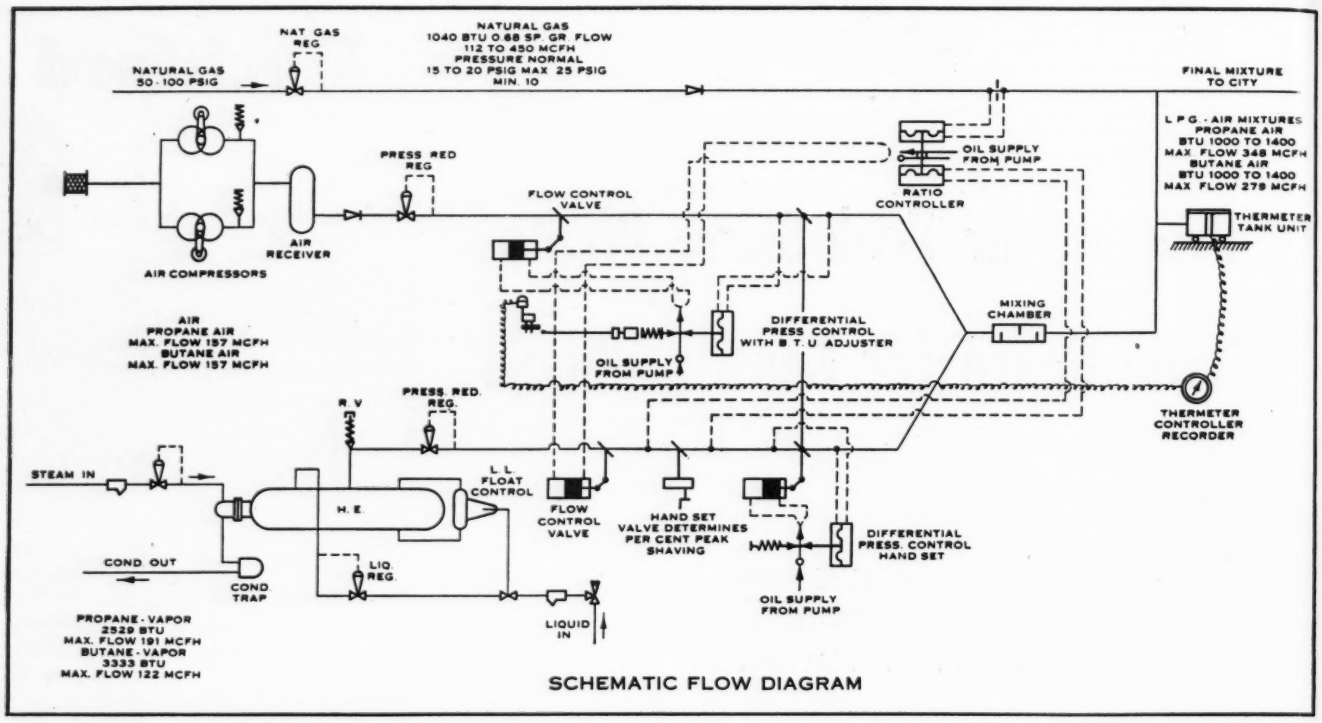

NAT. GAS REG.
NATURAL GAS 50-100 PSIG
NATURAL GAS 1040 BTU 0.68 SP. GR. FLOW 112 TO 450 MCFH PRESSURE NORMAL 15 TO 20 PSIG MAX. 25 PSIG MIN. 10
FINAL MIXTURE TO CITY
L P G. - AIR MIXTURES PROPANE AIR BTU 1000 TO 1400 MAX. FLOW 348 MCFH BUTANE AIR BTU 1000 TO 1400 MAX. FLOW 279 MCFH
PRESS. RED. REG.
FLOW CONTROL VALVE
OIL SUPPLY FROM PUMP
RATIO CONTROLLER
THERMETER TANK UNIT
AIR RECEIVER
AIR COMPRESSORS
AIR PROPANE AIR MAX. FLOW 157 MCFH BUTANE AIR MAX. FLOW 157 MCFH
DIFFERENTIAL PRESS CONTROL WITH B. T. U. ADJUSTER
MIXING CHAMBER
OIL SUPPLY FROM PUMP
PRESS. RED. REG.
R. V.
THERMETER CONTROLLER RECORDER
STEAM IN
L. L. FLOAT CONTROL
H. E.
FLOW CONTROL VALVE
HAND SET VALVE DETERMINES PER CENT PEAK SHAVING
DIFFERENTIAL PRESS. CONTROL HAND SET
COND. OUT
COND. TRAP
LIQ. REG.
OIL SUPPLY FROM PUMP
PROPANE - VAPOR 2529 BTU MAX. FLOW 191 MCFH BUTANE - VAPOR 3333 BTU MAX. FLOW 122 MCFH
LIQUID IN
SCHEMATIC FLOW DIAGRAM

Fig. 1. The general control scheme for Central Illinois' propane-air installation. Representatives of the utility, Stone & Webster Service Corp., and Phililps Petroleum Co. worked together in determining what the requirements for the standby installations would be and in designing the equipment, which was completed in June 1949.

Phillips Petroleum Co. resulted in the establishment of the following requirements for the peak shaving gas mixing control system which was furnished in its entirety by Cutler-Hammer Inc.

Requirements

1. Recording and control of heating value of the peak shaving gas to enable production of such gas at minimum heating value for satisfactory use and at minimum cost. A record of performance of these facilities was considered essential.
2. The peak shaving control to have sufficient flexibility in flow and Btu to cover satisfactorily all conditions encountered.
3. The equipment to function from a small percentage of peak shaving requirements to complete standby, requiring change of heating value in order to hold customer complaints to a minimum, and to provide means of adjusting the rate of make.
4. Ability to set the equipment for a certain percentage of peak shaving and have this percentage maintained as the demand changes throughout the day. It was also essential that the heating value of the peak shaving gas be changed as the percentage varied.
5. The change from peak shaving to standby operation to be made with a minimum of manual adjustment.
6. Operating adjustments, such as change in percentage of peak shaving gas, heating value, etc., to be as simple as possible, and equipment to function with a minimum of attention from operating personnel.
7. Starting and stopping of the peak shaving equipment to require a minimum of time and operating personnel.
8. Reliable control provided to permit delivery of peak shaving gas direct to the system without the use of storage holders.

Fig. 1 shows the general control scheme recommended.

In September 1948, Central Illinois placed an order with Phillips Petroleum Co. for complete engineering drawings and specifications for propane-air plants at Rockford and Freeport. Equipment was ordered from Phillips for both plants. The general construction contracts were awarded to the R. W. Stafford Co. of Chicago, and construction began in June of 1949. Both plants were completed and placed in operation in the early part of December. While no peak shaving requirements were anticipated during the winter of 1949-1950, forecasts had indicated that peak shaving would be required next year. However, by having them completed in December of 1949, crews have been trained in the operation of the two propane plants for next year's use, and they were available for peak shaving service in the event of unusually severe weather this past winter.

Rockford Operation

Utilizing the full capacity of the two Ingersoll-Rand 17-in. x 13-in. ES1 air compressors, the maximum capacity of the Rockford plant is 160,000 cfh of 1000-Btu propane air gas and 215,000 cfh of 1400-Btu propane air gas. The turndown ratio on this equipment is 30 to 1. In anticipation of further growth of Rockford, with consequent increase in gas requirements, the heat exchangers, regulating equipment and meter runs were sized for a maximum capacity of 258,600 cfh of 1000-Btu propane air or 348,500 cfh of 1400-Btu propane air gas. Provision for the added compressed air supply to meet this requirement is available by utilizing a standby compressor formerly used for pumping manufactured gas to Freeport.

The Freeport plant is similar in general design and layout but is smaller in capacity.

Utilizing the full capacity of the two Ingersoll-Rand compressors, the maximum capacity of the Freeport plant is 70,000 cfh of 1000-Btu propane air gas or 94,500 cfh of 1400-Btu propane air gas. This plant also incorporates a 30 to 1 turndown ratio.

Standby Advantages

The operation of these plants to date for short periods of time to train personnel, as well as for an entire 24-hour period, has resulted in completely satisfactory reports from operating personnel. With the plants available for operation on short notice, Central Illinois will be able to serve a greater number of space heating customers than could otherwise be accommodated with a fixed supply of natural gas from the transmission line company, and will be in a much better position to assure its present customers of continuity of gas supply.

What do the back fences say about you?

One neighbor tells another. And the dealer who installed Bryant automatic gas heating always rates high in those confabs . . . continues to win more jobs over the back fences, too!

Customer satisfaction is built into Bryant equipment. It's drawn in by the product designers, kept safe by the finest automatic controls, retained by the heavier construction that assures longer service life. The user is better satisfied . . . more pleased with the dealer who made the sale.

Yes, and Bryant lends a helpful hand in other ways. The Bryant distributor offers a single source for most every type of gas heating equipment. He furnishes valuable engineering assistance, maintains an adequate warehouse stock. And his co-operative funds aid in paying the cost of localized dealer advertising campaigns.

All this makes the Bryant dealer a worthy ally for the gas utilities because . . . what's said over the back fences can be equally beneficial to him and to you!

Let the pup be furnace man
. . . and water boy, too!

bryant

AUTOMATIC HEATING

The most complete line of gas heating equipment in the nation

Bryant Heater, Dept. 186,
17825 St. Clair, Cleveland, Ohio

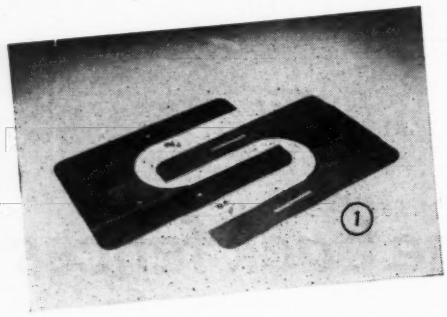
( ) Send me the new booklet that tells the Bryant story. ( ) Have your distributor call on me.

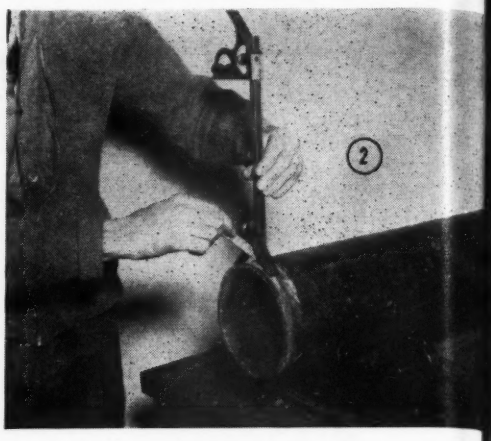
Name_____

Company_____

Address_____

City_____ State_____





A TEMPLATE DESIGN FOR MAKING PIPE BENDS

Shop fabrication of pipe bends, regardless of the angle of bend desired, will be made easier with use of the template and accessories shown on this page. After angle of the bend and the number of pieces required for it have been determined, the proper positioning plate is attached to the composition-board template. The template is slipped over the pipe, forming the angle desired, and the line of cut is marked off with chalk. The template was first described in "Linde Air Tips," publication of Linde Air Products Co., New York.

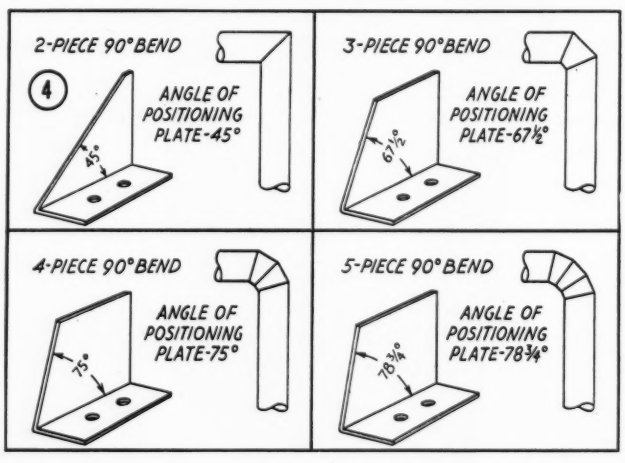
Fig. 1. Template assembled.

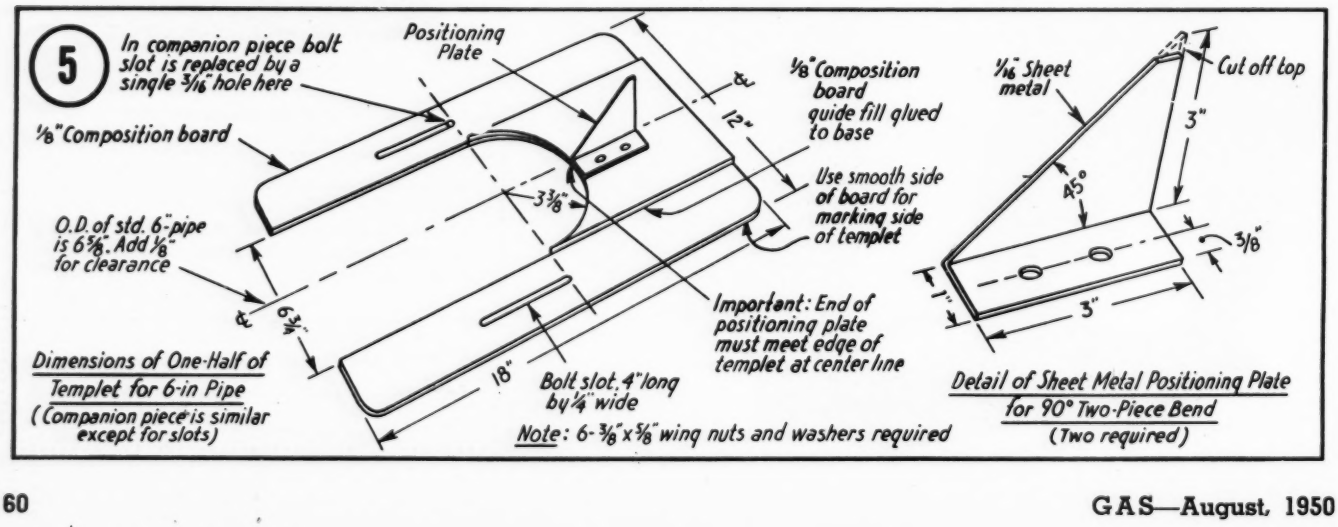
Fig. 2. First step in marking the pipe. The pipe is blocked, and with a square and level the center of the pipe is marked. Without moving the pipe, repeat this operation at several other points along the pipe. A straight line through these points will be the center line.

Fig. 3. Snug the template to the pipe with the positioning plate lying flat on the pipe along the center line. Then tighten the set screws, and, holding the template steady, lay out the cut around the pipe by sliding a flat soapstone along the template surface.

Fig. 4. Positioning plates for four types of 90° bends—two-piece, three-, four-, and five-piece. Plates can also be made for odd angles.

Fig. 5. Details of a template made for 90° bends in 6-in. pipe. Template itself consists of two pieces of composition board cut out to fit snugly around pipe. When closed, the two halves form a circle the same diameter as the pipe. When opened, they can be tilted to almost any angle. In making templates for other sizes of pipe, add ⅛-in. to the outside pipe diameter to give clearance.




5
In companion piece bolt slot is replaced by a single 3/16" hole here
Positioning Plate
⅛" Composition board guide fill glued to base
⅛" Composition board
12"
Use smooth side of board for marking side of templet
3⅜"
O.D. of std. 6" pipe is 6⅜". Add ⅛" for clearance
6¾"
Important: End of positioning plate must meet edge of templet at center line
18"
Bolt slot, 4" long by ¼" wide
Dimensions of One-Half of Templet for 6-in Pipe
(Companion piece is similar except for slots)
Note: 6-⅜" x ⅝" wing nuts and washers required
1/16" Sheet metal
Cut off top
3"
45°
3/8"
1"
3"
Detail of Sheet Metal Positioning Plate for 90° Two-Piece Bend
(Two required)

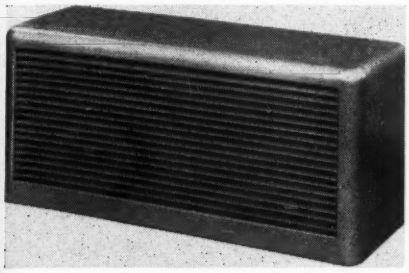
NEW PRODUCTS

Zone Heating Unit

SOUTH WIND DIVISION, Stewart-Warner Corp., 1514 Drover St., Indianapolis 7, Ind.

MODEL: No. 988 dual unit.

DESCRIPTION: This zone heating unit employs the "safety-sealed" principle by which gas is burned in a sealed combustion chamber. The burner operates under the forced



draft of a blower, drawing combustion air from the outside and discharging the combustion products to the outside through a 2-in. sealed vent. No room air is used for combustion. Room air is circulated by means of a centrifugal blower rated at 200 cfm. This model is rated at 31,000 Btu/hr. Cabinet dimensions are 12¼ x 14 x 32 in.

Sealing Compound

CRANE PACKING CO., 1839 Cuyler Ave., Chicago 13.

MODEL: John Crane Plastic Lead Seal No. 2.

APPLICATION: For joining threaded pipe connections or other closely fitted metal parts.

DESCRIPTION: This is a permanently plastic lead base compound consisting of fine lead powder in a specially developed insoluble vehicle which acts as a lubricant. Its nonhardening feature is a result of its having no volatile constituents.

Features of the Underwriters' approved compound include service as a gasket, eliminating the use of gaskets on reasonably flat surfaces. A thin layer of the material completely fills in minute surface imperfections and resists washing out by air, gases, or liquid under pressure. It is insoluble in a wide variety of liquids and gases. The compound prevents thread deterioration by forming a coating throughout the joint which protects the threads from oxidation and moisture.

Pipe Locator

THE PATHFINDER CO., 1726 Beverly Dr., Pasadena 7, Calif.

MODEL: Pathfinder.

DESCRIPTION: This pipe locator weighs less than 11 lb and can be operated efficiently by one man. The power switch is automatically turned off when the front and back panels are snapped together in the transport or storage position, so there is no danger of

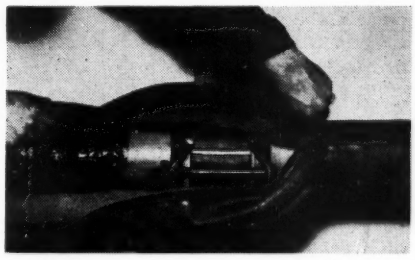
leaving the power on when the device is not in use. Standard miniature radio tubes, flashlight batteries, and hearing aid cells are used. The company will make a trade-in allowance for any pipe locator now in use.

Joint Protectors

DRESSER MANUFACTURING DIVISION, Bradford, Pa.

MODEL: Zipcoat line.

DESCRIPTION: Zipcoat for couplings is designed to cover and protect a coupled joint.



It has a bleeder valve to vent air during backfilling. Another Zipcoat is used for the protection of a circumferentially welded joint, and a third, which comes in 10-ft lengths, is used for insulating joints, eliminating costly boxing and permitting immediate trench backfilling.

According to the manufacturer, Zipcoats can be installed in one-tenth the time required to coat a joint. They have high dielectric strength and are said to give protection equal to or exceeding that of mill or yard-wrapped pipe. Each contains anaerobic microbiological corrosion inhibitor.

Range

GEORGE D. ROPER CORP., Rockford, Ill.

MODEL: No. 10-3502.

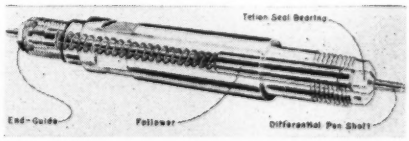
DESCRIPTION: This new 38-in. model is one of a group introduced at the Chicago

Furniture Mart recently. It is equipped with chrome hardware, a four-hour timer alarm-time clock, and an X-ray door with interior oven lighting. This same range built to CP standards with automatic oven and broiler lighter in designated No. 50-3502.

Stuffing Box

PITTSBURGH EQUITABLE METER DIVISION, Rockwell Manufacturing Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.

MODEL: Orifice meter stuffing box.



DESCRIPTION: This box reduces meter maintenance and leakage troubles at the pen shaft which transmits the motion of the meter's float and lies between high-working-pressure zones in the manometer and atmosphere-pressure zones in the chart case. It has been shown leakproof at a working pressure of 5000 psi.

Heart of the stuffing box is Teflon, a combination packing and bearing machined from synthetic plastic. It is tough and chemically resistant to water and all reagents except the molten alkalis. It can withstand temperatures up to 450°F.

This new stuffing box will be standard on all Rockwell Emco orifice meters, for both low and high pressure use. Packaged kits containing the box and appropriate compensating links and pen arm are available for converting meters already in service.

Heater

ESTATE STOVE CO., Hamilton, Ohio.

MODEL: 5000 Series.

DESCRIPTION: Available in both circulator and radiant types, this line offers the new "Intensi-Fire" combustion chamber with scientifically placed baffles to cause recombustion of flame products. The chamber

is porcelain-enameled to insure against rust or corrosion. The pressed steel, porcelain-enameled "air-flow" burner is a port-type burner with fin-like construction.

Automatic heat control, blower, and thermostatic blower control are offered as accessories for all models.

Draft Gauge

BACHARACH INDUSTRIAL INSTRUMENT CO., 7000 Bennett St., Pittsburgh 8, Pa.

MODEL: Draftrite.

APPLICATION: For detecting draft or

pressure inside a furnace and over a burner or for checking draft at the relief opening of draft hood.

DESCRIPTION: This instrument is used to indicate the neutral pressure point at the correct height in a furnace, as required in AGA installation standards for gas conversion burners. The test is made by opening the firing door slightly and pressing the slotted end of the draft tube, which is screwed into the back of the gauge, against the opening at one side of the firing door. The Draftrite is then moved up or down until the pointer is at zero, which indicates the exact location of the neutral pressure point. The gauge indicates pressure or draft as low as 1/1000 in. water, with a total pointer movement for 1/100 in. water pressure or draft.

The Draftrite comes in a leatherette case which holds the gauge and draft tube and fits conveniently into a pocket.

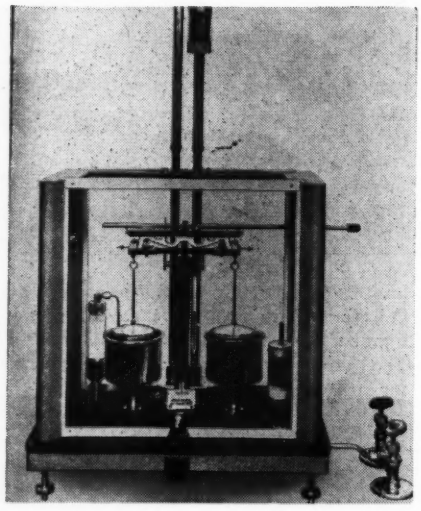
Gas Balance

AMERICAN RECORDING CHART CO., 3121 E. 11th St., Los Angeles 23, Calif.

MODEL: Arcco-Anubis laboratory gas balance.

APPLICATION: For permanent installation in the laboratory to determine specific gravity of gas sample brought in from the field.

DESCRIPTION: Comparative weight of a column of dry air and equal column of gas determines the specific gravity. An air dryer is employed to remove moisture. The instru-



ment also corrects for temperature and barometric pressure. The gas sample required is smaller than for any other laboratory gas balance, the manufacturer states, and no gas vacuum pump is required. A specific gravity range from .5 to 1.5 and, by the use of weights, a total range from .0 to 2.5 may be handled.

Floor Furnace

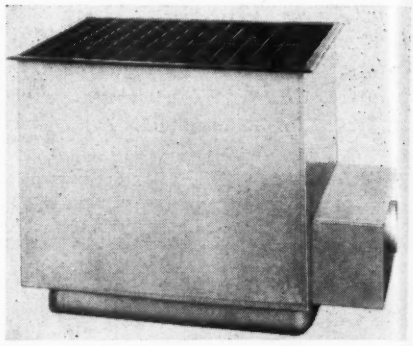
SURFACE COMBUSTION CORP., Toledo.

MODEL: Janitrol floor furnaces.

APPLICATION: Particularly designed for small homes, especially those without basements, where a compact, shallow furnace is necessary.

DESCRIPTION: The non-corrosive steel casing has a hammerloid enamel finish; heat exchangers are made more durable by use of a baked, high gloss enamel finish; and manifolding, burners, and controls (a single complete assembly) are protected by a removable housing.

Three sizes, approved for all gases, are in



production—30,000, 50,000, and 65,000-Btu per hour input ratings. All units are 27 9/16 in. in depth. All models are equipped with 100% safety shutoff, and completely automatic controls are optional.

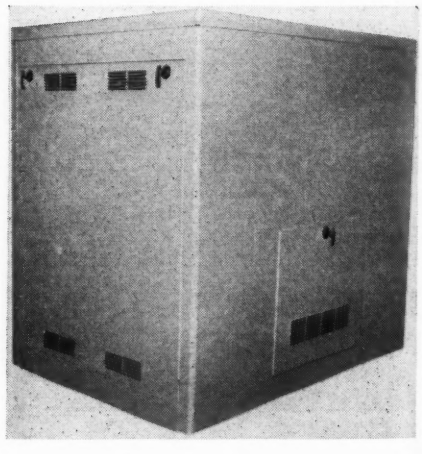
Heating Unit

G. C. EVANS SALES & MANUFACTURING CO., 4415 W. 15th St., Little Rock, Ark.

MODEL: Evans automatic heating unit.

APPLICATION: For heating caustic solutions contained in bottle and pan washing machines such as are used in carbonated beverage plants, breweries, dairies, and bakeries. Ideal for replacing gas, oil, or coal fired boilers or for use as standby equipment.

DESCRIPTION: The machines are automatic and are shipped as complete packages, including solution strainers, temperature controls for bottle washer, high limit and automatic pilot switches. Available for use with



natural, mixed, manufactured, or LP-Gases, the units are built in 15 standard and several special sizes from 300,000 to 1,440,000 Btu input rating.

The units are designed for direct heating, eliminating the necessity for steam in connection with the heating of the washer solutions. The solutions are strained of suspended matter and are brought directly into the unit.

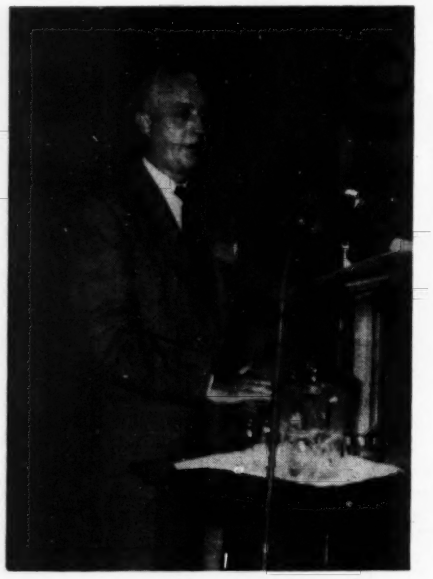
WIN A 30 GALLON WATER HEATER FREE!

NO, NOT YOU! That's just the headline from one of the advertisements run in San Diego and San Diego County by this company in our big 30 gallon water heater campaign this past Spring.

And to answer your next question: Yes, 30 gallon water heater sales are up.

This campaign is typical of the hard-selling campaigns put on by this company continually to help dealers sell more.

SAN DIEGO GAS & ELECTRIC COMPANY



GEORGE KELLY
... directed sales huddle

CREATING SALES

Westchester example cited at eastern meet

How Westchester (N.Y.) Lighting Co. successfully created sales of gas househeating equipment despite substantial price increases, as told by George Kelly of the company's sales department, set the tone for the New York-New Jersey Regional Sales Council, held at Spring Lake, N. J., June 19-20.

Mr. Kelly, chairman of the AGA-sponsored meeting, displayed reproductions of advertising and promotional pieces used in the campaign.

Big names in the industry participated in the two-day meeting. D. A. Hulcy, AGA vice president and president of Lone Star Gas Co., Dallas, pointed out how the need for sales action is liable to be overlooked in the midst of the tremendous over-all growth of the gas industry. B. H. Wittman, domestic sales head for Peoples Gas Light, Chicago, stressed the need for sound sales organization. Irving K. Peck, vice president of the Manufacturers Light & Heat Co., Pittsburgh, told of the problems facing gas utilities as they prepare to change over to natural gas. He underlined particularly the need for advance groundwork in public relations to prepare customers for the relatively small rate cuts that are possible and to counteract existing beliefs among customers that immediate and drastic rate cuts will be possible.

The astonishing demand for clothes dryers was pointed out by Edith Ramsay, home equipment editor of *American Home* magazine. Miss Ramsay also pointed out the advantages of gas over electricity for this job, which salesmen should stress in their presentations.

A warning to the gas industry to go after the new home market more aggressively was voiced by O. J. Hartwig, Long Island Home Builders Institute, who called attention to the lingering effects of the gas utilities' pre-war stand-off attitude toward new developments. Many insisted that the builder underwrite a good share of main extensions required to serve such projects, with the result that many contractors switched to electricity and are difficult to woo back into the gas fold.

R. Louis Town of Rheem Manufacturing Co. exhorted his listeners to put their direct selling contacts back to work to restore the industry's former record of 80% of all water heater sales—which has now dwindled to 60%.

W. D. Williams, assistant sales manager, Public Service Electric & Gas Co., Newark, was elected council chairman. Robert N. Laux, Kings County Lighting Co., New York, became vice chairman.

AGA Convention Agenda Told

The AGA tipped its hand last month, so now gasmen intending to travel to Atlantic City for the big convention Oct. 2 to 6 know that the following are just a few of the headline attractions:

A discussion panel on changeover, at a joint meeting of the Manufactured and Natural Gas Departments.

The showing of a new Texas Gas Transmission Co. film, "Natural for Industry."

A panel discussion on gas dryers.

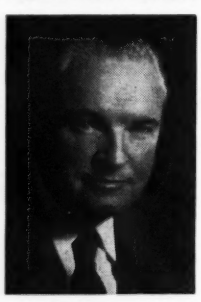
A talk, "Social Security Unlimited" by James K. Polk, New York tax authority.

A report by E. C. Brenner, Milwaukee, on the uses of various gases for supplementing natural gas in his city.

The story of how Michigan Consolidated Gas Co. converted its low-pressure system for pound-pressure gas.

A gigantic dealer meeting Oct. 5, with the final two days being designated "Dealer Days."

Tulin New CNGA President



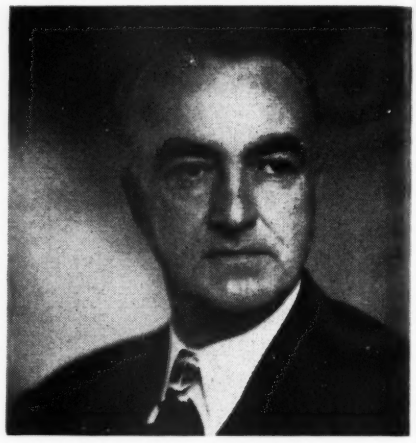
R. S. Tulin

R. S. Tulin, manager of the natural gas and gasoline department for Shell Oil Co., has been elected 1950-51 president of the California Natural Gasoline Assn., Secretary E. R. Millett Jr. announced following the annual meeting of the board of directors in Los Angeles in July.

Also named were George C. McLaren, Standard Oil Co. of California, vice president, and Mr. Millett, who was re-elected.

Mr. Tulin succeeds J. B. Taylor, Signal Oil & Gas Co.

Among nine members chosen for the executive committee were William Moeller Jr., Southern California Gas Co., Los Angeles, and J. S. Fluor Jr., the Fluor Corp. Ltd.



HUGH J. SMITH
... head man in Canada

300 Canadian Gasmen Attend Quebec Convention

Canadian gasmen unanimously adopted the slate of officers and executive committee members for 1950-51 as submitted to them at the association's 43rd annual meeting at Murray Bay, Quebec, June 20-23.

Hugh G. Smith, secretary, Consumers Gas Co. of Toronto, is the new president; R. M. Perkins, Windsor Gas Co. Ltd., is first vice president; and Raymond Latreille, Quebec Hydro-Electric Commission, Montreal, is second vice president. George W. Allen, Toronto, continues as executive secretary and treasurer.

Nearly 300 delegates from the U. S. and Canada attended the meeting, which included boat trips, president's reception, and banquet, as well as a full schedule of timely speakers.

Hugh H. Cuthrell's paper on "Progress in the Gas Industry" declared that if the present accelerated rates of discovery and production are maintained until 1955, the U. S. is assured at least a 30-year supply of natural gas. Mr. Cuthrell's paper was read by Clifford E. Paige, president of Brooklyn (N.Y.) Union Gas Co.

Hall M. Henry, NEGEA Service Corp., Cambridge, Mass., discussed "Manufacture and Economics of Oil Gas." Other speakers and their topics included "Functions and Scope of the Sales Department in a Gas Utility Company" by F. X. Mettenet, Peoples Gas Light & Coke Co., Chicago; "Cut Yourself A Piece of Cake" by Frank W. Williams, secretary of the AGA Residential Section; "Fundamentals of Galvanic Corrosion" by A. B. Lauderbaugh, Manufacturers Light & Heat Co., Pittsburgh; "The Manufacturers' Place in the Gas Industry," presented to the manufacturers section by GAMA's H. Leigh Whitelaw; and "Industrial Pensions Programs" by J. Clifford Adams, general counsel for the Central Ontario Industrial Relations Institute of Toronto.

Corrosion Course Scheduled

With R. B. Hoxeng of Case Institute directing and two past presidents of the association acting as instructors, the National Assn. of Corrosion Engineers and Case Institute will hold a short course in corrosion

Sept. 25-29 at the institute's facilities in Cleveland.

The two ex-presidents, F. L. LaQue of International Nickel and Dr. R. B. Mears of Carnegie-Illinois Steel Corp., will join five others on the lecture platform for the school. Two lectures a day will be given from Monday through Thursday, with a single lecture Friday. The course is intended to serve as a refresher as well as a course for neophytes.

Heat Transfer Conclave In London Announced

An international discussion of postwar heat transfer developments will be held in London, Sept. 11-13, 1951, it has been announced by the American Society of Mechanical Engineers.

Thirty British technical societies and engineering and technical societies of Australia, New Zealand, India, South Africa, Belgium, Denmark, France, Holland, Norway, Sweden, Switzerland, and the United States are cooperating in the planning of the meeting, and will participate in its activities.

Preliminary plans indicate that the following subjects will receive most attention: recent information on physical properties of gases and gas mixtures pertinent to their heat transfer characteristics, measurement problems related to heat transfer, mass transfer and heat transfer, heat transfer by sweat and film cooling, condensation at high speed flow, heat transfer to liquid metals, and the analogy method for the solution of conduction problems.

NEGA Issues Calendar

The scheduling of five divisional meetings was announced last month by New England Gas Assn. Secretary Clark Belden.

Two are set for October—the operating division meeting at Providence Oct. 24 and the appliance servicing conference in Boston two days later. Two more are planned for November — the home service development conference at Boston Nov. 6 and the safety conference, to be held at the same locale Nov. 9.

The operating division is due to meet Jan. 17 in Boston.

Newsnotes

The Natural Gasoline Assn. of America is expecting an attendance of 350 for its southern regional meeting, which has been scheduled for Oct. 27 in Tyler, Texas. The East Texas Natural Gasoline Men's Club will participate.

T. S. Zajac, corrosion engineer, Shell Oil Co., Houston, was elected chairman of the Natural Gasoline Assn. of America corrosion research project committee at the recent semi-annual meeting of that group in Fort Worth. F. A. Prange, chief metallurgist, Phillips Petroleum Co., Bartlesville, Okla., was elected vice chairman.

The Michigan Gas Assn., meeting June 19-20 at Mackinac island, selected Henry Tuttle, vice president and treasurer of Michigan Consolidated Gas Co., Detroit, as its new president. Fred H. Bunnell, Consumers Power Co., Jackson, is new vice president.

Earl H. Eacker, president, Boston Consolidated Gas Co., was awarded a certificate for his outstanding service in standardization at the annual president's luncheon of the American Standards Assn. June 22. A member of ASA's board of directors, Mr. Eacker received the certificate in appreciation of his contributions to standardization, not only in his own company and industry, but particularly in development of American standards.

Charles E. Bennett, president, The Manufacturers Light & Heat Co., Pittsburgh, has been appointed chairman of the program committee for the 1950 fall meeting of the AGA Natural Gas Department, to be held in conjunction with the annual convention in Atlantic City.

CALENDAR

SEPTEMBER

New Jersey Gas Assn. Annual Convention—Monmouth hotel, Spring Lake, N. J., Sept. 8.

National Petroleum Assn.—Hotel Traymore, Atlantic City, Sept. 13-15.

Mid-West Gas Assn. 27th Gas School & Conference — Iowa State College, Ames, Sept. 14-15.

Controllers Institute of America Annual Meeting—Edgewater Beach hotel, Chicago, Sept. 17-20.

OCTOBER

AGA Annual Convention and GAMA Exhibition of Gas Appliances and Equipment—Atlantic City, N. J., Oct. 2-6.

Texas Mid-Continent Oil & Gas Assn. Convention—Dallas, Oct. 4-5.

National Safety Congress & Exposition—Chicago, Oct. 16-20.

Independent Natural Gas Assn. of America Annual Meeting—Shamrock hotel, Houston, Oct. 23.

National Metal Exposition—Amphitheatre, Chicago, Oct. 23-27.

Natural Gasoline Assn. of America Southern Regional Meeting — Blackstone hotel, Tyler, Texas, Oct. 27.

NOVEMBER

National Hotel Exposition—Grand Central Palace, New York, Nov. 6-10.

Wisconsin Utilities Assn. Gas & Electric Section Convention—Schroeder hotel, Milwaukee, Nov. 8-10.

Mid-Southeastern Gas Assn.—The Sir Walter hotel, Raleigh, N. C., Nov. 9-10.

American Petroleum Institute Annual Meeting—Los Angeles, Calif., Nov. 13-16.

American Society of Mechanical Engineers Annual Meeting—Hotel Statler, New York, Nov. 26-Dec. 1.

AGA-SGA Employee Relations Conference—New Orleans, Nov. 27-28.

DECEMBER

The American Society of Refrigeration Engineers—Hotel Commodore, New York, Dec. 3-6.

Institute of Cooking and Heating Appliance Manufacturers Semi-Annual Meeting—Cincinnati, Dec. 4-6.

JANUARY 1951

Pipe Line Contractors Assn. Annual Convention—Shamrock hotel, Houston, Jan. 9-10.

MARCH

Mid-West Gas Assn.—Hotel Fontenelle, Omaha, March 12-14.

Gas Appliance Manufacturers Assn. Annual Meeting—The Homestead, Hot Springs, Va., March 19-21.

New England Gas Assn. Annual Meeting—Hotel Statler, Boston, March 29-30.

APRIL

AGA Sales Conference on Industrial & Commercial Gas — Shoreham hotel, Washington, D.C., April 2-4.

Mid-West Regional Gas Sales Conference, Residential Gas Section—Edgewater Beach hotel, Chicago, April 9-11.

Southwestern Gas Measurement Short Course—University of Oklahoma, Norman, April 10-12.

AGA Distribution, Motor Vehicle, and Corrosion Conference—Hotel Peabody, Memphis, April 16-18.

Southern Gas Assn. Annual Meeting—Biloxi, April 23-25.

National Conference of Electric and Gas Utility Accountants—Hotel Sherman, Chicago, April 23-25.

Industrial Gas Assn. — French Lick Springs, French Lick, Ind., April 26-27.

AGA Industrial & Commercial Gas Section, Industrial Gas School—William Penn hotel, Pittsburgh, April 29-May 4.

MAY

AGA Natural Gas Department Spring Meeting—Dallas, May 7-8.

Pennsylvania Gas Assn.—Wernersville, Pa., May 14-16.

AGA Production and Chemical Conference—Hotel New Yorker, New York, May 14-16.

JUNE

Institute of Cooking and Heating Appliance Manufacturers Annual Meeting—Cincinnati, June 5-6.

Canadian Gas Assn.—Bigwin Inn, Lake of Bays, Ontario, Canada, June 16-20.

NEW CONSTRUCTION

$3 BILLION

Construction expense records topple

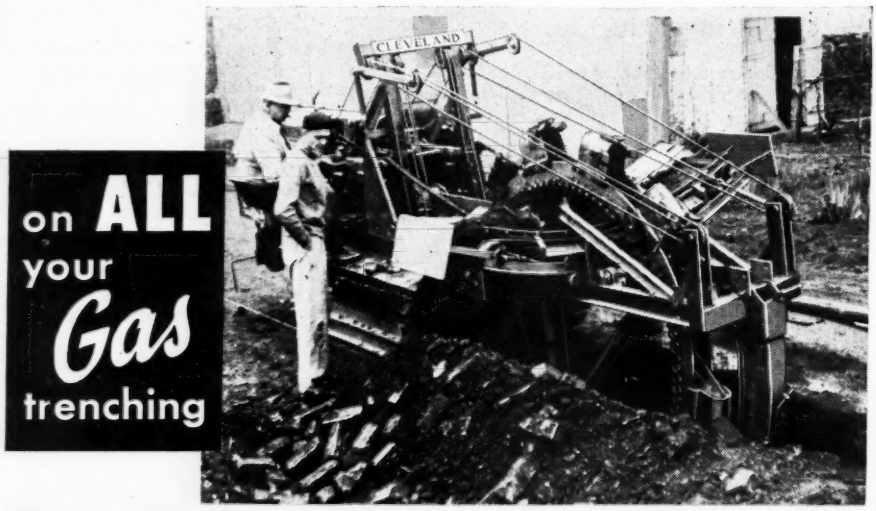
The nation's boomingest industry—the gas utility industry, of course—will spend more than $3 billion in expansion facilities and services in the next five years, a survey of the American Gas Assn. has revealed.

U. S. gasmen, whose entire plant was worth but $5 billion in 1945, will have, by 1954, an additional gross construction worth $6.1 billion. In the period 1944-49, the industry spent $2.96 billion for new facilities —including the cost of purchase of the Big and Little Inch lines. To no one's surprise, AGA's survey proved the natural gas branch of the industry to be the big spender; $2.75 billion of the $3.14 billion to be spent in 1950-1954 will go for natural gas transmission and distribution facilities — only $388 million will be spent by all other segments of the industry.

All expenditure records for a single year are set to be broken this year, AGA reported. More than $1 billion will be spent in 1950 for construction, the survey noted, with little abatement in activity predicted for 1951. It is expected that the big boom will taper off in the three remaining years of the five-year period. About $1 billion (51% of anticipated natural gas expenditures) is earmarked for the building of transmission lines; all but $200 million of this will be spent in 1951 and 1952. Projects which may be undertaken later in the five-year period are necessarily indefinite and unsettled at the moment, and increases in allocations for transmission line construction in 1952, '53, and '54 are probable.

The industry's distribution systems will be improved and expanded $1.11 billion worth in the five-year program (80% by natural gas utilities) and $426 million will go into production and storage facilities.

AGA explained the basis of its survey as follows: totals for each year of 1945-50 were obtained from information furnished by companies representing 90% of industry revenues. Newly authorized projects—as yet not underway—were also included. For the years 1950-54, AGA totaled the proposed projects to be undertaken by the major companies who have construction scheduled, added FPC-certificated projects approved before June 20, 1950, and included certain pending projects as yet unapproved but for which approval seems probable.



on ALL your Gas trenching

CLEVELANDS

mean dependable top yardage, top profit

25 years of close engineering cooperation with the Gas Industry have made CLEVELANDS the most efficient and profitable solution to all your trench needs—from the smallest house service trench to the largest transcontinental pipeline. CLEVELANDS are tough, strong and compact—built to CLEVELANDS recognized higher standard of quality throughout. You get steady reliable schedule-beating yardage with a year 'round digging season—you get fast economical moves from job to job. You save on CLEVELANDS remarkably low fuel and maintenance costs, while the ability of each CLEVELAND model to do more different kinds of jobs means important savings on your total machine investment. See your distributor or write direct.

THE CLEVELAND TRENCHER CO. • 20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO

Expansion Forces Northern Natural To Build New Offices

Expansion of operations, accompanying its system capacity growth from 242 MMcf per day to more than 600 MMcf since the end of World War II, is forcing Northern Natural Gas Co. out of its rented space in the Aquila Court building, Omaha, and into a brand new six-story building of its own.

Ground was scheduled to be broken late last month, and completion is anticipated by Oct. 31, 1951.

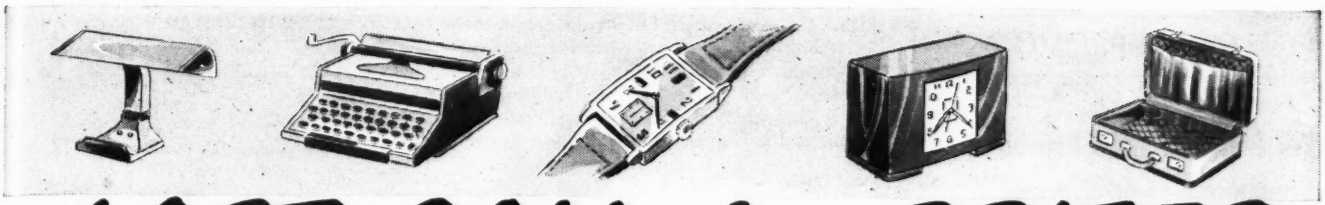
Featuring functional styling similar to the United Nations Secretariat in New York City, the new Northern Natural home will have 52,000 sq ft of useable floor space, with movable partitions adding almost unlimited flexibility. Future plans call for the addition of two wings at the rear, if and when needed. A 40-car garage for company cars and a 75-car off-street parking facility are also provided for.

The $50-million building will, of course, be air conditioned with gas.

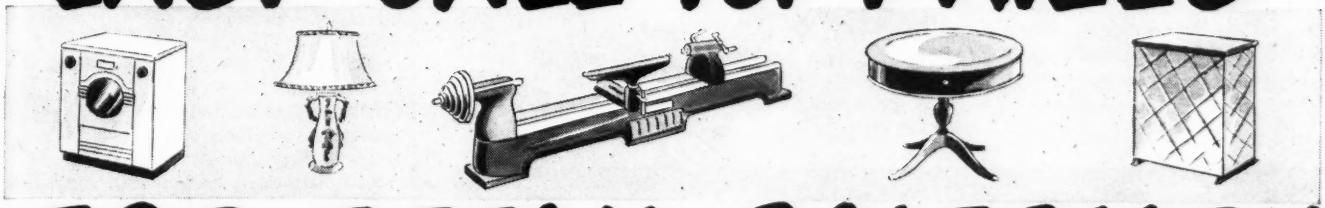
Footnotes on Construction

Five 30,000-gal. LP-Gas tanks have been installed by B. C. Electric Co. at its Victoria, B. C., plant. The city's reserve of gas for peak shaving has thereby been quadrupled.

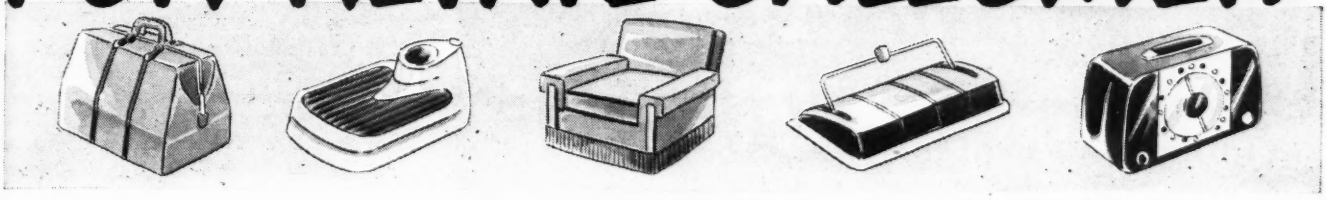
Preliminary work started last month on the construction of a new 6000-kw gas turbine power plant being erected in Rutland by the Central Vermont Public Service Corp. The plant, to be in operation by June 1951, will be powered by a General Electric unit costing $1.2 million and consuming daily 11,000 gal. of Bunker C fuel oil.



LAST CALL for PRIZES



FOR RETAIL SALESMEN



All Aboard 1950

"COURT OF FLAME"

Automatic Gas Water Heater

SALES CAMPAIGN

March 1 to September 30, 1950

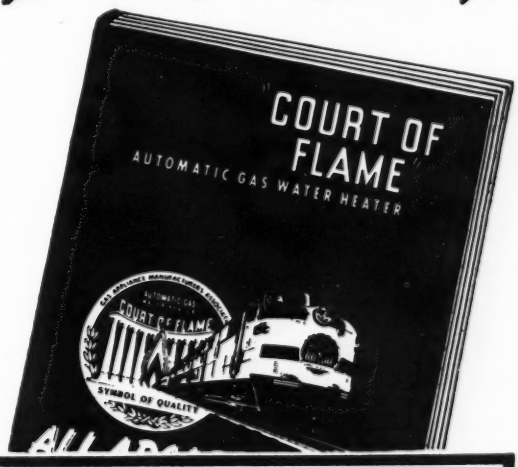
STILL AVAILABLE — hundreds of merchandise prizes for retail water heater salesmen. Every retail salesman can still get prizes because EVERY SALE gets prize points. Retail salesmen entering 1950 "Court of Flame" Sales Campaign NOW, WITHOUT DELAY can win prizes of their choice shown in this big, 32-page Prize Catalog. Free copies to each salesman. SEND NAMES, GIVE HOME ADDRESSES.

This Campaign Conducted by the Water Heater Division of

Gas Appliance Manufacturers Association, inc.
60 East 42nd Street, New York 17, N. Y.

FOR THE LAST BIG RUN ON HUNDREDS OF PRIZES

Get this Free Catalog



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ALLCRAFT MANUFACTURING COMPANY, Inc.
AMERICAN GAS MACHINE COMPANY
BASTIAN-MORLEY CO., Inc.
BRYANT HEATER DIVISION,
AFFILIATED GAS EQUIPMENT, Inc.
THE CLEVELAND HEATER COMPANY
THE COLEMAN COMPANY, Inc.
COMBUSTION ENGINEERING-SUPERHEATER, Inc.
CONTINENTAL WATER HEATER COMPANY
DAY AND NIGHT DIVISION,
AFFILIATED GAS EQUIPMENT, Inc.
FAUCEHOT HEATER COMPANY
GENERAL WATER HEATER CORPORATION
HANDLEY BROWN HEATER COMPANY
M. M. HEDGES MANUFACTURING COMPANY, Inc.
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THE HOTSTREAM HEATER COMPANY
HOYT HEATER COMPANY
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LAWSON MANUFACTURING COMPANY
LOVEKIN WATER HEATER COMPANY
MISSION APPLIANCE CORPORATION
MUSTEE HEATER COMPANY
NATIONAL STEEL CONSTRUCTION CO. OF INDIANA
PENNSYLVANIA RANGE BOILER COMPANY
PERFECTION WATER HEATER COMPANY
PIONEER WATER HEATER CORPORATION
REPUBLIC HEATER CORPORATION
RHEEM MANUFACTURING COMPANY
RUDD MANUFACTURING COMPANY
and their West Coast affiliate H. R. Basford Co.
SECURITY MANUFACTURING COMPANY
SERVEL, Inc.
A. O. SMITH CORPORATION
JOHN WOOD COMPANY

SALES and PROMOTION

Portland Brochure Proves Gas Advantages for the Home

A check chart in the form of a catalogue, giving comparative costs, list prices, and advantages of gas for all domestic purposes is a new weapon being used by Portland (Ore.) Gas & Coke Co. in the competitive fight for the Portland and suburban markets.

A local book giving local prices and local comparisons in advantages and services, it uses the check-off technique to prove that Gas Has Got It for water heating, cooking, househeating, refrigeration, clothes drying, and garbage disposal—the *six* big jobs.

It makes capital of the four gas rate cuts within 15 months, free service, dependability, freedom from upkeep, speed, cleanliness, and longer life. It depicts models of various appliances and lists retail prices. It stresses the extra service provided in the form of home service advice and instruction.

And the clincher is—when (not if) natural gas comes, the company will convert appliances free of charge.

The brochure has been mailed to all present customers, with a card enclosed for those seeking further information.

THE BEST SALESMAN YOUR GAS EQUIPMENT EVER HAD
MODEL 54
GASAPACK
DEVELOPS CONFIDENCE
IN YOUR GAS HEATER OR FURNACE BECAUSE IT IS A PRECISION-BUILT CONTROL
CHECK OFF THESE EXCLUSIVE GASAPACK FEATURES:
• 100% FAIL SAFE
• 100% Safe Lighting
• 100% SHUT OFF SAFETY
• 100% AUTOMATIC
• MULTI-STAGE Flame Control
• Silent in Operation
• Built-in Pressure Regulator
• Built-in Pilot Filter
• Built-in Safety Shut-off with Automatic Pilot
• Reduces Production Costs
• Simplifies Factory Assembly and Field Installation
• ONLY ONE UNIT — to Buy — Stock — Install
• A. G. A. Listed for Gas Heaters, Furnaces
• Immediately Adaptable to Automatic Temperature Control, either electrical or mechanical
• Available with Side or Bottom Outlet, Left or Right Hand Mounting
Over 10 million readers are learning the advantages of AP Dependable Gas Controls.
of Course it's Controlled By
Write for the whole story on GASAPACK today — for your Heating Appliances.
AUTOMATIC PRODUCTS COMPANY
2526 North Thirty-Second Street
Milwaukee 45, Wisconsin
DEPENDABLE Controls
SYMBOL OF DEPENDABLE GAS HEATING

"Proof of Profits" Theme Sparks Commercial Range Drive

"Here's evidence that modern gas cooking equipment will save you money." That is what the gas industry will be saying to the commercial cooking industry when the "Proof of Profits" campaign gets under way this fall. During the months of September, October, and November, the first national campaign for the sale of commercial gas cooking equipment takes place.

Gas companies, kitchen equipment dealers, manufacturers of commercial gas cooking equipment, and AGA are joining in the campaign, which is being prepared by AGA with the industrial and commercial gas section's food service equipment committee acting as the spark plug.

AGA's autumn commercial cooking advertising campaign will pinpoint the "Proof of Profits" theme, quoting outstanding personalities in the volume cooking field who tell how the use of gas has proved profitable to them. These ads will run in 10 business papers in the "feed 'em for pay" industry.

GAMA will get into the act with a brand new advertising campaign, its first ad in a series to appear in the August issue of *Restaurant Equipment Dealer*.

Several manufacturers will tie in their company advertising with "Proof of Profits," using in their ads an identifying character which will also appear in AGA and GAMA ads.

AGA has distributed to gas companies a booklet called "How To Put On A 'Proof of Profits' Campaign." AGA has in production a portfolio for presentation by gas companies to their dealers and customers. In the piece are listed the many specific ways in which gas equipment increases profits.

South Jumps Gun With Old Stove Round Up

It's already round up time in the South—Old Stove Round Up time.

With most utilities prepared to don chaps and spurs for the annual drive on dilapidated ranges come Sept. 1, companies in several southern states are jumping the gun this month. In the far West, meanwhile, gas companies and their dealers are holding off until Oct. 2 for their unified campaign.

Utilities, trade associations, and manufacturers will lay out an estimated $1 million for national advertising and $6 million for local advertising to achieve the 1950 goal of 1.5 million sales, 25% higher than 1949's quota. September-through-December issues of leading women's and home magazines will carry big ads to push the drive, and 30,000 dealers are being briefed with GAMA broadsides. AGA's mailing, for utilities and manufacturers, went out July 12.

Officials at AGA headquarters estimate that 60% of the gas ranges in use have had 10 years or more of service.

Gas is doing the winter air conditioning in 54 new "twin-type" homes erected in the Mount Airy section of Philadelphia. General Electric gas-fired warm air furnaces and packaged air conditioners, installed side by side in the basements, use common ducts to carry temperature-controlled air throughout each home. This is claimed to be one of the first medium-priced (about $17,000 apiece) housing developments in the north to use year-round conditioning.

Women Broadcasters Learn How to Plug Gas Laundries

How to broadcast information about a gas-equipped laundry was demonstrated to the Assn. of Women Broadcasters at their recent annual meeting in Cleveland.

In the introduction of the show Jean Clarke Thompson of AGA's publicity bureau pointed out that women broadcasters could obtain much newsworthy material for their programs and do it inexpensively—if they took a tape recorder to the demonstration floor of a gas utility company, interviewed one of the home economics staff about gas equipment for the laundry, or talked over a laundry problem with a customer on the demonstration floor. Since recordings are easily edited by cutting the tape, the broadcaster could cull out any part of her interview or split up the recordings to use on two or three broadcasts.

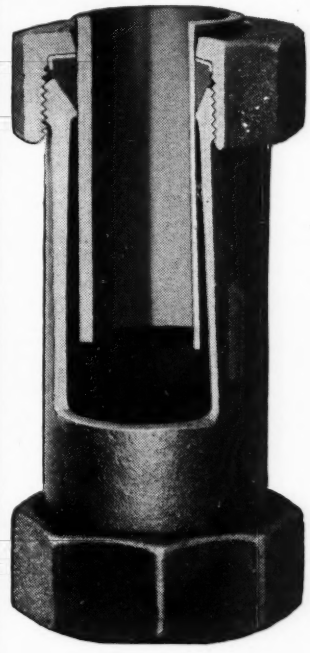
Highlighting the visual-oral demonstration was a complete laundry-utility room set up in the Grand Ballroom of the Hotel Cleveland and equipped with a gas dryer, automatic gas water heater, and gas furnace.

Sales Slants

Brooklyn Union's commercial sales department is whipping up interest among its plumber-dealers in the volume water heating market with informal breakfast gatherings. Started in June, the meetings lay heavy stress on two new sure-fire commercial sales items—a conversion burner for "bucket-a-day" coal pots and a long-life immersion-coil tankless water heater. Apartment house owners reportedly have been enthusiastic about the $15 conversion burner.

It might have been an ill wind that stirred the flames that burned down the old Indian's cabin in San Diego county, Calif., last November, but in the end it "blew some good" for both its victim and San Diego Gas &

NORMAC
COUPLINGS, SLEEVES and FITTINGS

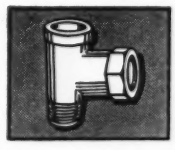


for maximum deflection, ease of "stabbing," complete confinement of the rubber!

So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.

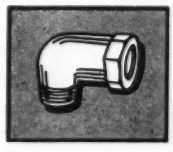
NORMAC COUPLINGS are made with 5" centers in all sizes. NORMAC SLEEVES are identical in design except that they are made with 10" centers. Nuts and gaskets are interchangeable.

COMPRESSION-END SERVICE "TEE"



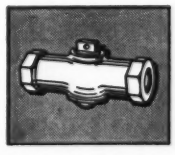
First fitting of this type ever produced with full coupling depth and special threads on male end to prevent dropping into old hand taps when used to replace standard threaded fittings.

COMPRESSION-END SERVICE "ELL"



Extra depth makes it possible to "stab" pipe into stops and without measuring, pull back a safe distance to allow ultimate deflection eliminating possibility of strain against tap in main.

COMPRESSION-END IRON BODY BRASS CORE SERVICE STOPCOCKS



End the necessity of threading on the job plus the elimination of the threads themselves — combining all the advantages of NORMAC COUPLINGS and the best in stopcock design. 2½" coupling depth on each end.

NORMAC BRASS FITTINGS DEVELOPED IN 1939 FOR USE WITH COPPER TUBING

Our complete line of brass fittings can be used either on new installations or where copper is run through old steel pipe in large or small openings. The center to end dimensions of NORMAC TEES correspond with old malleable iron fittings. This feature is extremely important in the use of these fittings in one foot openings where the tubing must line up with the steel which has been removed.

Write for the NORMAC CATALOG of Gas Distribution Equipment

NORTON-McMURRAY MFG. CO.

39 SOUTH LA SALLE ST. • CHICAGO 3, ILLINOIS

Couplings • Meter Bars • Sleeves • Cocks • Bell Joint Clamps • Service Tees & Ells

Electric Co.'s electrical dealers. When the Bureau of Radio & Electrical Appliances heard about 109-year-old Joaquin Paipa's plight, it was preparing an electric blanket promotion. It immediately went into action on Joaquin's behalf, each dealer member promising to contribute $1 from every electric blanket sale to a house-building fund. Tieing in its advertising and promotion, the bureau quickly raised $1000.

The newest addition to the growing list of advertising characters in use by gas companies is "Speedy Therm," a pleasant little guy who symbolizes Rochester (N.Y.) Gas & Electric Co. gas service. He is the copyrighted property of A. W. Whittlesey, a recently elected member of the RG&E board of directors.

MANUFACTURERS

Heating Contractors Learn About Natural Gas

In Virginia, where natural gas is beginning to put in an appearance, they're teaching heating contractors how it works and what it can do.

In a series of technical meetings, held under the auspices of the Virginia Associated Plumbing & Heating Contractors and arranged by American Radiator & Standard Sanitary Corp., dealers and their personnel have been learning about the scope of the market for this type of fuel, the operation and construction of gas boilers, heating controls, and sub-assemblies; merchandising of gas-fired heating equipment; and sales, installation, and service of water heaters.

The meetings, lasting through the day and into the evening, were held in nine communiites between May 22 and June 8. Sales personnel of American-Sstandard and Detroit Lubricator Co. acted as instructors.

* * *

In Milwaukee, too, dealers, wholesalers, and salesmen are boning up on gas heating. Free factory training sessions are being conducted by the Perfex Corp., manufacturer of heating controls. Three-day courses are being held which give instruction in fundamentals of heating, including the operation, installation and servicing of controls; electricity; heat, including transfer, measurement, and distribution; systems, their capacities, heat distribution methods, etc.; and field and service engineering and sales.

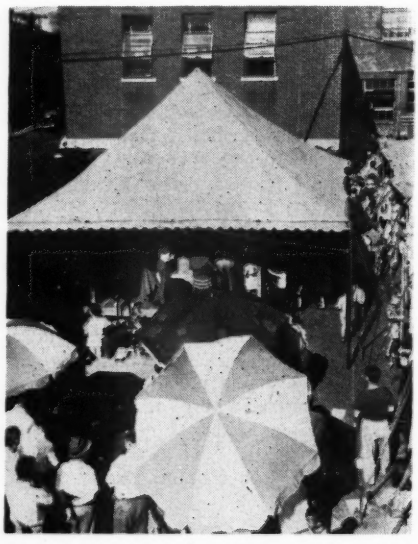
The Milwaukee School of Engineering is cooperating.

Sprague Celebrates 50th Birthday With Open House

More than 2000 employees and their families attended an open house party sponsored by the Sprague Meter Co., Bridgeport, Conn., June 26, held as part of the firm's 50th anniversary celebration. Civic, industrial, educational leaders from the surrounding area, editors of various technical journals, and representatives from many utilities throughout the United States also attended the affair.

Held at the main plant in Bridgeport, the anniversary program included a tour of the plant, an outdoor luncheon, and contests for adults and children for which more than 50 prizes were awarded.

Speaking in an on-the-spot radio program from the company grounds were F. Leslie Fairchild, president of the firm; Elmer H. Werthman, vice president; Edith L. Ballou, supervisor of sales; and H. Ward Cheeseman, senior salesman, who has the largest employee service record. May Bradshaw Hayes,



What looks like a circus crowd is a portion of the employees and friends who lined up for refreshments during Sprague Meter Co.'s 50th birthday party.

METAL RIM

LMPCO

DIAPHRAGMS

25 YEARS AHEAD

Metal Rim Diaphragm Superiority has been proven over and over again by gas companies throughout the United States and Canada. Never before has any invention done so much towards the advancement of gas measurement.

It's an old story, but true—Perfection can be attained only by long experience combined with quality materials and expert workmanship. You make no compromise with quality when buying Metal Rim Diaphragms.

They are 25 years ahead of all others.

FOR

SPRAGUE No. 1-A	IRONCLAD No. 1	ALSO:
SPRAGUE No. 1-D	TOBEY No. 1	All-Leather for
SPRAGUE No. 2	Iron Case	TOBEY-A
SPRAGUE No. 3	Gas	TOBEY No. 2
SPRAGUE No. 5	Meters	IRONCLAD No. 2

METAL RIM DIAPHRAGMS

Measure Gas Accurately,
Give Twice the Wear,
Are Not Blocked or Formed,
Made from the Finest Meter Leather Especially Tanned and Carefully Selected,
Easy to Install and Easy to Prove,
Oiled with LMPCO Oil which stays in the Leather Through a Ten Year Period,
No Rim or Port Hole Leaks,
Better Meter Performance,
These Features make them Metermen's Choice.

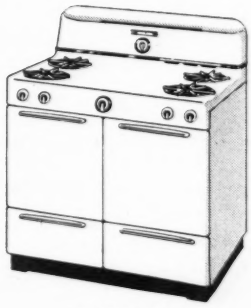
LANCASTER METER PARTS CO.

Post Office Box 378 Lancaster, Ohio

MURRAY

means NEW BUSINESS, NEW PROFITS for you!

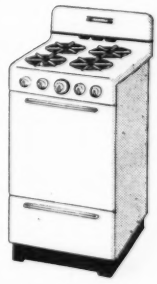
Model GA-44



Model GA-42

Model GA-40

Model GA-30



Model GA-20

MURRAY Streamlined Gas Ranges!

Three wonderful 40″ models, plus a deluxe 36″ and compact 20″ range complete this fast-selling Murray line. And here are some reasons why they sell! "Waterfall" front, no seam at front-top of range. Extra-large ovens, smokeless broiler pan and grid. Cooking and oven timer—fine 4-hour interval unit built into kitchen clock. Robertshaw thermostat. Built-in lighting. Hi-Lo gas cocks usable with any type gas. Burner bowls stamped right into range top —no seams! Choice of grouped or separated burners. Plenty of storage. Fiberglas insulation. Durable chrome appointments. Unit welded frames. Gleaming porcelain enamel on steel. There's a new Murray Gas Range to suit most any requirement!

MURRAY is BIG NEWS to every wholesaler and dealer. Here's a timely opportunity to build new business, new profits with a line publicized from coast to coast! Sell complete, *really new* gas ranges . . . by Murray —for over 10 years makers of quality Home Appliances. This entire, new high quality line is engineered and manufactured in one of the world's most modern appliance plants! Be sure *you* receive full details on new, profitable Murray Gas Ranges.

MURRAY

urges you to get full particulars now.

If you are a wholesaler, kindly write on your letterhead.

If you are an appliance dealer, kindly forward convenient coupon.

The Murray Corporation of America
Home Appliance Division, Dept. 8
1220 South Washington, Scranton, Pa.

Gentlemen:

Please send all details on your new Gas Range Line.

Name_____

Address_____

City_____ Zone _____ State _____

MURRAY

New England radio commentator, conducted the interviews.

Featured during the plant tour was the demonstration of highly specialized machines made for the producing of Sprague meters. One of the largest producers of gas meters and regulators in the United States, the company was founded in Bridgeport 50 years ago by Henry H. Sprague.

Water Heater Records Topple

Manufacturers of automatic gas water heaters were still in the driver's seat at the end of May, a recent GAMA report of shipments for the first five months of 1950 shows. Continuing to pierce all previous record ceilings, shipments hit 831,600, almost 25,000 better than 1947's record of 806,900.

Stacked up against 1949's comparative score, 1950 shipments are 61.7% ahead. For the month of May, they topped 1949 by 61.4%. It was the third straight pace-setting month.

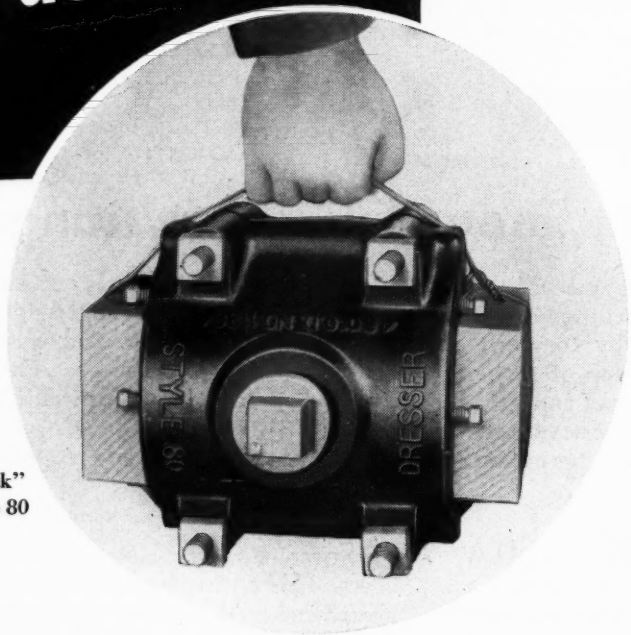
Newsnotes

The world's largest research laboratory devoted to the development of safety equipment for all industries was dedicated in Pittsburgh, June 14, by the Mine Safety Appliances Co. About 400 leaders in safety and industrial hygiene and health, as well as top industrial executives, attended the dedication exercises. Principal speaker was Ned H. Dearborn, Chicago, president of the National Safety Council.

Pontusco Corp., a subsidiary of United States Pipe & Foundry Co. of Burlington, N. J., and Compagnie de Pont-a-Mousson, France, has bought the United Concrete Pipe Corp. of Baldwin Park, Calif.

The air conditioning department of the General Electric Co., Bloomfield, N. J., has a new distributor serving Delaware and Philadelphia counties in Pennsylvania—The Harold E. Sweeney Corp., Philadelphia.

COMES fully assembled



Dresser "Ready-Pack" Sleeve, Style 80

Ready to go when you get it, the Dresser Style 80 Sleeve cuts delays in making repairs . . . saves you valuable man-hours. There are no loose parts, no trimming of gaskets, no handling of bolts.

To install the sleeve, your repairman simply loosens, then replaces four nuts. A wrench for tightening end screws is furnished with each sleeve. The whole operation takes only 5 to 10 minutes.

Ideal as tapping sleeve, also. Sizes for 3″ to 8″ pipe. Order today. For larger repairs, use Dresser Style 57C.

DRESSER *Repair Sleeves*

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). In Texas: 1121 Rothwell St., Houston. In Canada: 629 Adelaide St., W., Toronto, Ont. Sales Offices: New York, Philadelphia, Chicago, Houston, Los Angeles.

FINANCIAL

Volume Sales, Revenues Climb to Dizzy Heights

That volumetric sales, operating revenues, operating income, and net income in April were still reflecting the effects of the continued swing to gas is borne out in recent AGA and Federal Power Commission tabulations.

On a therms-sold basis, AGA shows an increase for the month of 31.1% over April 1949, with customers having received 3,833,277,000 therms. That the trend is quickening rather than slackening was shown in the fact that sales for the 12-month period ending in April were up but 11.6% over the previous period—37,678,745,000 therms as against 33,761,534,000.

Leading the parade were sales of natural gas, up 32.8% for the month to a new high of 3,487,520,000. The year's increase was 12.8%. But manufactured gas sales showed a substantial gain—9.5% for the month—as did mixed—28.1%. This compares with the yearly increases for both fuels of but 1%.

Natural gas companies reporting to FPC scored fat gains over April of 1949, with operating revenues up 26.4% to $108.6 million, operating income up 37.8% to $22.8 million, and net income up from $13.2 million to $19.4 million.

Volumetric sales tallied by the FPC totaled 161,768 MMcf for the month — 19.7% above last year.

Natural Gas Arrival Brings Rates Down

The movement of natural gas into new territories has brought about proposals for rate decreases in recent weeks with two medium-sized utilities having filed rate slash schedules. On the other side of the fence is Peoples Gas Light & Coke Co., Chicago, which has applied for an off-peak boost.

The Roanoke (Va.) Gas Co. expected to save its 16,000 customers about $200,000 under terms of new schedules filed with the city council recently. Roanoke is anticipating the introduction of natural gas this month.

Wisconsin-Michigan Power Co., Appleton, Wis., has been authorized to effect reductions aggregating $99,000 a year for its 8976 customers in the area.

Peoples Gas has told the Illinois Commerce Commission it needs boosts averaging 30% in rates to interruptible users in order to forestall rate boosts for residential users.

MISCELLANY

Union Magazine Lauds Calapco Employee Program

The labor and employee relations program of Central Arizona Light & Power Co., Phoenix, has been impressing observers throughout the U. S. for some time. Last month the program impressed the editors of the *Electrical Workers' Journal,* official organ of the International Brotherhood of Electrical Workers, AFL.

Calapco's program, which includes liberal pension provisions, health and welfare service, and excellent cafeteria and recreation facilities, formed the basis for an entire issue of the *Journal,* which was loud in its praise of the work being done by the Arizona gas-electric utility. The union observers could find no fault with the systems of conferences between management and employees, with wages, with safety precautions and programs, with working conditions, or with Calapco's constant progress in improving employee benefits.

"Calapco," said the *Journal,* "is a jewel of a company from any employee's viewpoint. It's president, Harry Sargent, vice president John Kimball, and all members of its management staff set an example in cooperation with the unions and with employees that is of vast benefit to all—stockholders included. The Calapco management looks forward to the constant improvement of labor relations —and is rewarded with loyal, sincere and happy employees throughout its organization."

Servel Gets Set To Fight Anti-Trust Suits

Servel Inc. intends to "defend vigorously" its position in the two anti-trust suits filed against it last June.

In a letter to Servel distributors throughout the U. S., company president W. Paul Jones has reaffirmed Servel's opinion that, to the best of its knowledge, the company has not violated federal anti-trust laws. "We are completely confident that . . . we will be vindicated," Mr. Jones said.

His letter to distributors outlines the complaint filed by the Department of Justice in Philadelphia (charging that Servel, because it makes the only gas-fueled refrigerator, is in a monopoly position) as being "utterly beside the point in the face of the competition from the many electrical household refrigerators offered for sale today . . ." Anyway, Servel does not, in the broad sense, make and sell a *gas* refrigerator, Mr. Jones said, but rather a unit operating on the absorption principle, models of which are presently operated in Canada with electricity as their fuel, and which use other fuels in certain areas. Servel does not monopolize the absorption principle in its patents as charged by DJ, Mr. Jones said. "On the very day that the Philadelphia complaint was filed . . . New York newspapers were advertising another refrigerator operating on the absorption principle . . ."

Of the case in Pittsburgh, where a grand

Having SLIDE RULE trouble?

When the problem is moving air or gas, turn to *R-C dual-ability* for accurate, dependable answers

That's one job we know, inside-out. For almost a century, we've been air-and-gas specialists, exclusively. Without being immodest, we think our engineers are the best informed in the industry, on blowers, exhausters, gas pumps and related equipment.

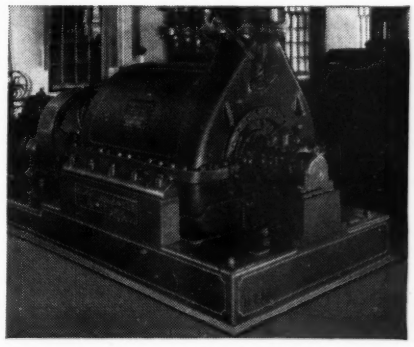
They have an extensive line to draw on, too. They make unbiased recommendations between Centrifugals and Rotary Positives—we're the only company offering this *dual choice.* With capacities ranging from 5 cfm to 100,000 cfm, we can supply standard units closely matched to the job, for efficiency and economy.

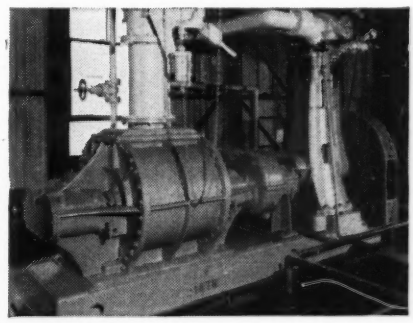
As to how R-C equipment performs, our old-time, repeat customers are the best answer to that. They'll testify that you will reduce your buying and operating problems when you call on R-C air-and-gas specialists.

ROOTS-CONNERSVILLE BLOWER CORPORATION
508 Oregon Avenue, Connersville, Indiana

CENTRIFUGAL

5-stage Centrifugal Gas Booster for public utility. Capacity 14,000 cfm.





ROTARY

Type RCG Rotary Positive Gas Pump in manufactured gas plant. Capacity 3,300 cfm.

ROOTS-CONNERSVILLE BLOWER BUILDERS R-C SINCE 1854

ONE OF THE DRESSER INDUSTRIES

jury has returned an indictment of Servel, for alleged price-fixing practices, Mr. Jones told the distributors that "Servel has never been a party to such actions as alleged."

In reaffirming the company's intention to battle the two charges, Mr. Jones insured dealers that shipments would not be impeded by the court actions.

Newsnotes

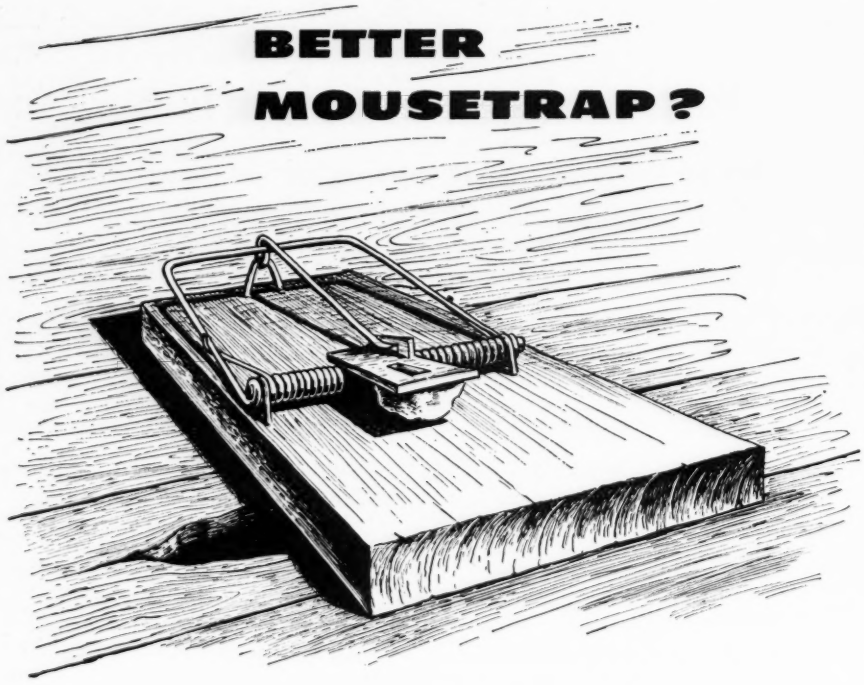
On two grounds Federal District Judge Richard S. Rodney of Wilmington, Del., recently dismissed two suits for $75 million triple damages against The Columbia Gas System Inc., New York City. The actions had been brought in 1938 by Ben Williamson Jr., as trustee of Inland Gas Corp. and Kentucky Fuel Gas Corp. The judge decided that dismissal in 1939 of two companion cases involving the same parties rendered the suits *res judicata* (a thing already judged), and that the statute of limitations barred further consideration. The suits charged anti-trust violation.

A graduate fellowship in the School of Chemical Engineering at the University of Oklahoma, to start in September 1950, has been established by Maloney-Crawford Tank & Manufacturing Co., Tulsa. The purpose of the fellowship is to promote fundamental research which will be of interest to the petroleum industry. The fellowship is open to Chemical Engineering students who have already completed one year of graduate study.

A tidelands bill giving disputed offshore water rights back to the states is awaiting action by the House of Representatives following its clearance recently by the House Rules Committee. The measure guarantees state ownership and control of tidelands lying within the traditional geographic boundaries of the states—except as it applies to Texas, where such land is defined as that extending 10½ miles out. States would get all royalties from petroleum exploration within these bounds, 37½% of royalties beyond, as far as the continental shelf.

A postponement of 90 days, requested by Phillips Petroleum Co., Bartlesville, Okla., the Wisconsin Public Service Commission, and the FPC staff, has moved hearings on the probe into Phillips' status as a natural gas company to Sept. 11.

Laclede Gas Co.'s St. Louis coke plant passed into the hands of Great Lakes Carbon Corp. June 29. The three top operating men in the plant transferred to the carbon company and will continue to run the plant. The plant has 65 Koppers ovens and 8 Piette ovens and produces 250,000 tons annually.



The story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

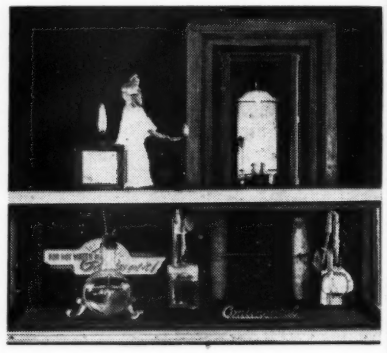
Gas purification is a parallel case.

Iron Sponge, preferred for the removal of H_2S seventy-five years ago, is still preferred today. And for these same reasons . . . simplicity, economy and effectiveness.

Iron Sponge operates with high efficiency at high or low pressures, has excellent capacity and activity, gives long service between foulings and is simply and quickly regenerated.

CONNELLY, Inc.

3154 S. California Ave., Chicago 8, Ill.
Elizabeth, N. J. • Los Angeles, Calif.



By simply dropping by the Seattle Gas Co., delegates to the PCGA convention this month in Seattle can see for themselves the proof that gas is the "magic" fuel.

On display there will be Continental Water Co.'s replica of the machinery—described by Hero more than 2000 years ago—used to open the doors to the temples when an altar fire was lighted. The idea among the Greeks was, of course, that the gods signified their approval of the burning sacrifice by mysteriously causing the doors to open.

Here's what really happened, as the display shows:

When the fire was kindled at the altar, the air receiver under it was heated, the air expanded and acted on the water in the large receiver, forcing it through the syphon pipe into the bucket. As soon as sufficient water entered the bucket, it dropped opening the door and raising the counterweight. The apparatus was so fixed that the bucket reached the ground before the syphon pipe was quite uncovered.

When services were concluded and the fire extinguished, the air receiver cooled down, the action was reversed.

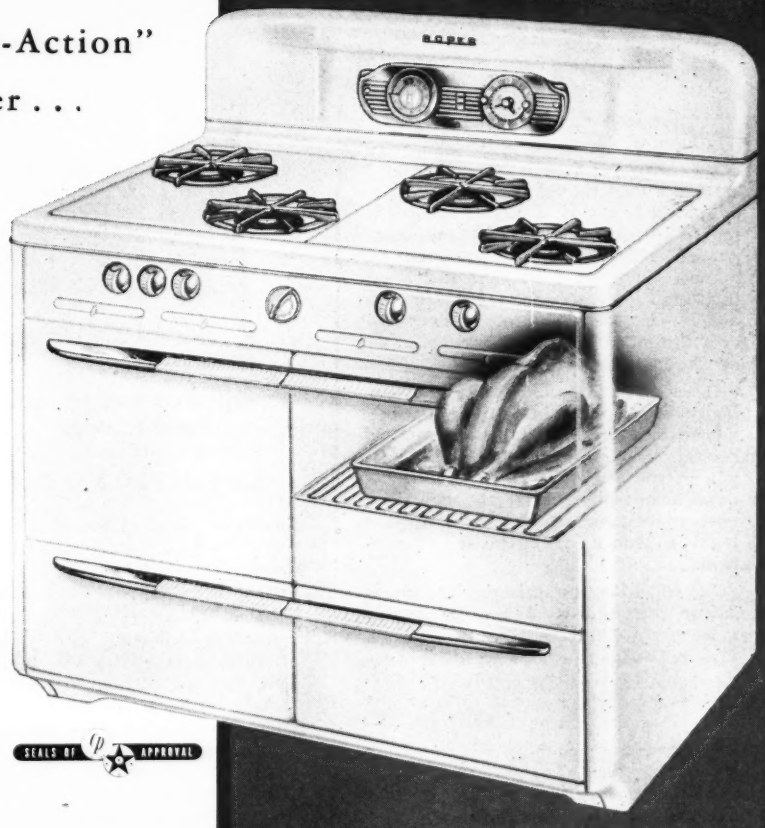
RESULTS

FEATURE ROPER

"AMERICA'S FINEST GAS RANGE"

Sensational New "Positive-Action" Oven That Pre-heats Faster . . . Bakes and Cooks Better

Equipped with amazing new bar-type, super-speed burner and direct "heat-flow" interior construction, the new ROPER "Bake-Master" oven represents a long stride forward in oven performance. Fast . . . uniform throughout in temperature maintenance . . . and exceptionally economical to use . . . this fine oven holds instant appeal for the consumer. Tell her about this and many other distinctive new ROPER Gas Range features.



SEALS OF APPROVAL

More Sales-Stimulating CROWNING ACHIEVEMENTS

- Center-Simmer" Top Burners
- Exclusive "Staggered" Cooking Top
- "Insta-Flame" Automatic Lighters
- "Insta-Matic" Clock Control
- Infra-Red "Roper-Glo" Broiler

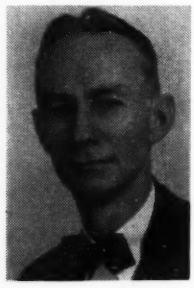
Look To The New ROPER
More Features To Offer . . .
More Value To Sell

GEO. D. ROPER CORPORATION • ROCKFORD, ILLINOIS
Offices and Warehouses in Principal Distribution Centers

Planning A Corrosion Control Program

In order to sell management and engineers on the value of cathodic protection for distribution systems, and to prepare a blueprint for organizing a protective program, the AGA corrosion committee has undertaken the compiling of a comprehensive symposium on the subject. Responsibility for the job fell to M. C. Miller of Ebasco Services Inc., New York. Mr. Miller prepared first drafts, which each participant revised to reflect his own views. The result was a 15-part work which was presented at the AGA Distribution Conference in Detroit last April.

Because of its great bulk the study had to be tailored somewhat for GAS' use, and divided into installments. Presented here are five of the first six parts, space considerations dictating the omission of the introduction by D. R. MacCollum, Rochester (N.Y.) Gas & Electric Co. This installment considers preliminary planning. Next month, parts detailing organization of a program will be published.



A. D. Simpson

Initial Steps in Organizing Program

By A. D. SIMPSON JR.
United Gas Corp., Houston

WE now have a corrosion department in Houston, headed up by a competent corrosion engineer who is training four junior corrosion engineers. We have a planned program contemplating expansion of cathodic protection wherever economical and practical. The cost of our program spread over 10 years is estimated to be $1 million. But we can show an estimated 30% annual return on that investment.

Therefore, I would recommend to you:

First. If you do not have on your staff a competent corrosion engineer with many years' broad experience, or cannot hire such an engineer, by all means secure the services of a group of corrosion consultants who have had the broad experience so essential to the success of a program.

Second. Analyze your corrosion leak record and corrosion costs, both tangible and hidden. Estimate possible savings from use of cathodic protection throughout your system where economical and practical. Study economics of using all steel-coated pipe with cathodic protection, as compared to cast iron. Consider possibilities of lighter-weight steel pipe with good coating and cathodic protection to reduce costs of new extensions.

Such an analysis and study would show to what extent your company should embark on a corrosion control program, and would indicate the manner in which the work should be handled to best advantage: that is, whether to depend upon outside consultants which might be desirable if the program will be limited to a few specific lines or areas from time to time, or whether to organize a corrosion department to be staffed and trained to carry on all phases of the program.

Third. Sell top engineers and management on the program. We found our management prone to question cathodic protection operation and maintenance costs which are kept separate on our books. The fault was ours. We had not taken the trouble to tell them that, for every dollar spent on cathodic protection, we were saving two to three dollars in operation and maintenance costs in addition to the hidden or intangible savings.

Management is not directly interested in number of corrosion leaks but in the amount of dollars saved as compared to cost. Sell your management. Your corrosion consultants can be of real help.

Fourth. Sell cathodic protection *down the line*—even down to the laborers, meter setters, meter readers and others—because the failure or success of your program depends on their cooperation and understanding of basic requirements.

Fifth. Plan initially for adequate operation and maintenance of any and all cathodic protection installations made.

Sixth. Cooperate with other utilities operating underground structures, electric, water, communication, etc. Advise them early of your program. Consider economics and ad-

Controlled Odorization
IN NATURAL GAS DISTRIBUTION

with the New Consolidated
TITRILOG

CONSOLIDATED TITRILOG
Model 26-102

Accurate control of the odorization of natural gas is a major problem facing many gas distribution companies today. The importance of odorizing gas to a known and fixed level, in order to assure its safe and economical distribution, is ever increasing with the rapid expansion of natural gas utilization.

The Consolidated Titrilog is now being used in production plants and on distribution lines to continuously record the concentration of the odorant in the stream. Thus, a constant odor level in the gas is insured and a permanent record is acquired for legal evidence of effective odorization.

The Titrilog quantitatively records sulfur compounds such as H_2S, SO_2, mercaptans, thioethers, thiophene, and organic disulfides in concentrations as low as 0.1 ppm or 0.005 grains per 100 cubic feet. Compounds of specific interest may be separately determined over a wide range of concentrations.

For complete information on the Consolidated Titrilog and other applications, such as problems in corrosion, sour-gas treating, etc., write for Bulletin CEC-1810-X11.

SPECIFICATIONS

Sensitivity The Titrilog quantitatively records oxidizable sulfur compounds in concentrations as low as one part in ten million or 0.005 grains per 100 cubic feet.

Power Requirements The Titrilog operates on standard 60-cycle 115-volt power. It requires approximately 6 amperes.

Cabinet Dimensions The Model 26-102 Titrilog is housed in a floor-mounted cabinet 66-inches high, 22½-inches wide, and 18½-inches deep. The strip-chart recording milliammeter is mounted at eye level, and directly below it is the control panel.

CONSOLIDATED ENGINEERING CORPORATION
Analytical Instruments for Science and Industry
620 NO. LAKE AVE. PASADENA 4, CALIFORNIA

vantages of joint installations.

If we were to start all over again from scratch, but knowing what we now know about the use of cathodic protection and the large savings possible, we would adhere to the suggestions as I have given them to you. They are discussed in further detail in the articles that follow.

Analyze Corrosion Costs on System

By C. L. MORGAN
United Gas Corp., Houston

ANALYSIS of corrosion costs for a specific system is an estimate of number of corrosion leaks; amount and value of gas lost; costs of repairs; loss of revenue if any; pipe replacement costs including salvage value of pipe removed; depreciation; and the intangible cost of hazards resulting from explosions. In making such an analysis, it appeared to us that a practical procedure would be to estimate the above for specific lines or sections where the various factors were known or could be determined with reasonable accuracy.

For the Texas Division of United Gas Corp., we made such a study. One of the first steps was to review leak records. Fortunately, maintenance and repair orders were available covering a period of about 10 years. These were tabulated to list corrosion leaks and costs of repairing those leaks. Distribution leak maps were prepared to show areas of greatest concentration.

Budget Studies

Capital replacements were tabulated and analyzed and replacements were shown on maps. Budgets for previous 10 years were studied.

From data secured, corrosion leak frequency curves were prepared for typical sections or lines for the older, poorly coated steel lines in which we were particularly interested, and corrosion costs were estimated. These curves were projected to estimate useful life of lines and annual corrosion cost including depreciation. These figures, of course, were applicable to many areas of our systems where soil conditions result in quite rapid corrosion of steel lines.

Actual cost records were available for numerous line replacements which had been made because of corrosion. Comparative estimates were made of what it would have cost to apply cathodic protection and repair all leaks.

Other factors were given consideration, such as salvage value of pipe, reduction in explosion hazards, etc.

$1 Million

The results of these studies showed that corrosion was costing our company, on the Texas properties only, about $1 million annually.

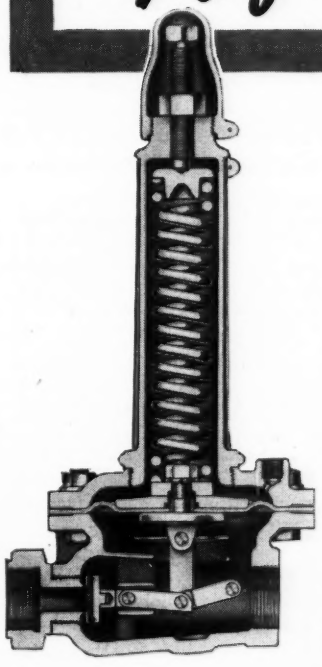
The result of our cathodic protection installations over five years of operation has shown that the extensive use of cathodic protection in densely built-up city areas, including the business district section of Houston, is practical and is stopping further corrosion.

Findings

Our studies convinced us that:

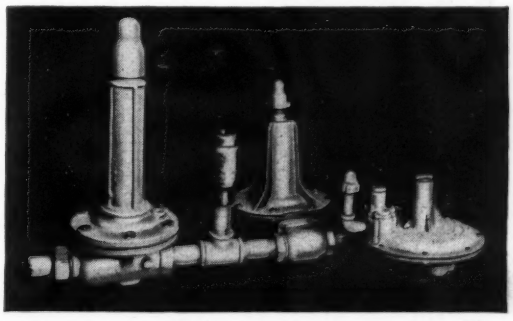
1. A 30% annual return on investment could be realized for money spent on cathodic protection installations on the older, poorly-coated steel line in areas where the soil is highly corrosive.
2. A $1 million cathodic protection program, spread over a period of 5 to 10 years, could be justified.
3. Most line replacements, where such replacements were being considered because of frequent corrosion leaks, could be avoided. Repair of all leaks and application of cathodic protection usually would be much cheaper, resulting in appreciable cash savings and lower operation and maintenance costs in the future.
4. Cathodic protection could be applied to these older lines (not yet in the stage of needing replacement, but where frequent corrosion leaks were occurring) primarily to stop further corrosion and reduce leak repair costs, gas losses, etc. The life of such lines, we feel sure, can be extended 10, 25, or 50 years.
5. As a general policy, all new extensions

IN THE HIGH PRESSURE FIELD
THERE IS SAFETY
IN Reynolds...



Accurate, Safe Control

of tremendous pressures is an ever present problem in the gas field. Reynolds field Regulator illustrated at left is one of the many high pressure regulators built by Reynolds. It is thoroughly tested and proved in service. It handles up to 1,000 pounds safely reducing same to pounds. For more than fifty-five years Reynolds has designed and built gas regulators. Safety, accurate performance, years of service—these are some of the built-in factors responsible for Reynolds enviable position in the Gas Control Field.



Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.
GAS CONTROL SINCE 1892

of steel lines should be placed under cathodic protection as a part of the initial installation.

We sold management on such a program.

To organize for carrying it out calls for cautious planning, education of company personnel, selection and training of corrosion engineers, obtaining suitable equipment, and setting up routine design, installation and operation procedures to insure obtaining maximum benefits from all installations.

With complete information on corrosion costs and estimates of savings which would be obtained from expanded use of cathodic protection, it was not difficult to "sell management."

Sell Management on Protection Economics

By C. W. BEGGS

Public Service Electric & Gas Co.
Newark

MANAGEMENT wants facts and figures. How many dollars can be saved for each dollar spent or invested? What is the saving in cash expenditure initially, and what will be the saving in future operation and maintenance costs? What will be the annual operating and maintenance cost of the cathodic protection installations? Those are the figures management wants and needs. Any forward-looking executive will spend a dollar to save spending two, or invest three (if available) to realize an annual saving or return of 30%.

With factual figures and data on annual corrosion costs, and estimates of cathodic protection costs which show possible savings and annual returns in the order of those just mentioned, and with a concise, plain-English report with recommendations, any engineer can sell management.

Future Effects

One question frequently raised by management concerns future effects on depreciation. Be prepared with the right answer for your system. What will be the effects of a corrosion-free system? How much will overall life of the system be extended if all or a major percentage of corrosion is eliminated? To what extent is the present "book" life of your system based on actual corrosion rate of your pipelines? There are many factors involved.

Consider also the beneficial effects of having a well-protected, corrosion-free, pipe system when for various purposes a system evaluation study is made. The increased value may be an important item.

Extras

Evaluate the added value of pipe removed for various reasons — abandonment of line, replacement to increase capacity, or road widening and grading. This is a large, valuable item.

The fact should be emphasized that one good corrosion engineer, devoting full time to operation of a number of cathodic protection installations on a system, can do more to stop corrosion leaks than one or two large maintenance crews and at 1/4 to 1/10 the total annual cost.

Sell Workmen on Cathodic Protection

By W. R. BROUGH

Mountain Fuel Supply Co.
Salt Lake City

TO obtain best results from cathodic protection installations, it is essential that personnel throughout the company who will be involved in any way in the operation and maintenance of the system be taught the fundamentals of corrosion and cathodic protection, and the need for cooperation and coordination of efforts.

It is difficult for the layman to realize that rusting of pipes or corrosion can be halted by a simple application of electric current. This has been found true throughout the organization from the engineers down to the workmen. It has been found on a number of systems that whatever efforts have been put

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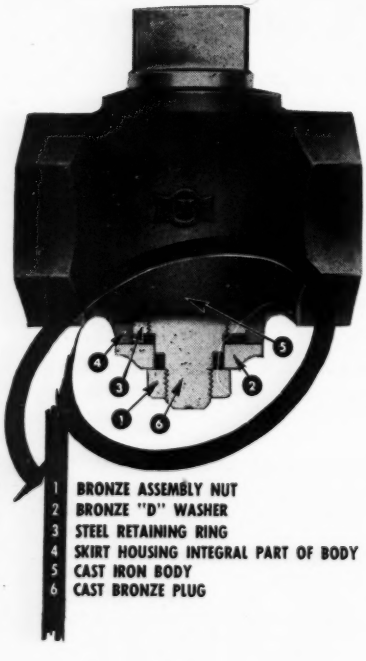
FEATURES


1 BRONZE ASSEMBLY NUT
2 BRONZE "D" WASHER
3 STEEL RETAINING RING
4 SKIRT HOUSING INTEGRAL PART OF BODY
5 CAST IRON BODY
6 CAST BRONZE PLUG

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- Steel Retaining Ring Assembled to Bottom of Plug—Eliminates Possible Damage to Precision Ground Surface of Plug and Body.
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- Steel Retaining Ring Located below Shoulder of Body—Permits Freedom for Service Adjustment of Plug.
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Also HAYS STANDARD
HEAVY PATTERN IRON BODY
GAS STOP

For 75 Years the Gas Industry has relied on HAYS Iron Body Gas Stops

C. L. Morgan

C. W. Beggs

forth to explain in plain English what causes corrosion and how it can be stopped by the application of cathodic protection have paid big dividends. Some companies have made use of demonstrations to *show* corrosion—how it is measured, and how protection is applied using galvanic anodes or rectifiers.

Design

To obtain maximum benefits from cathodic protection installations, with a minimum of operating and maintenance expenses, lines or sections insulated off at time of installation of protection need to be kept insulated. To accomplish this, system design engineers when preparing orders for service and main extensions and rebuilding of system need to provide insulating couplings and test leads where required. The most economical time to install these is during design.

Where lines under protection are insulated electrically from water systems, the services must be insulated at the main, curb or meter; therefore, where there is insulation at the meter the meter setters and changers must make sure that meters are not set without insulating bushings and, where meters are replaced, that the bushings are not removed. One meter not properly insulated can destroy the protection on a sizeable system. Of course this condition will be observed at the next periodic test when the potentials-to-earth are found to be low. A day or two of testing may be required to locate the place where the bushing was omitted. That time could have been eliminated by cooperation on the part of the meter men.

Demonstration

One practical method of educating company personnel in corrosion and cathodic protection is to prepare a demonstration soil box. With small samples of different metals such as black-iron pipe, galvanized pipe, copper, zinc and magnesium and corrosion instruments, the complete mechanics of corrosion and cathodic protection can be shown and explained very simply in terms which even the laborers can grasp. Using such a demonstration kit, a corrosion engineer can visit various districts or sections and put on these demonstrations and talks to small groups. The results will be surprising and well worthwhile.

This same demonstration kit and talk has been used to good advantage in gaining cooperation of other utilities such as water systems. After such a demonstration, cooperation and mutual understanding have been found to be greatly improved.

Consult Operators of Underground Utilities

By C. A. ERICKSON

The Peoples Natural Gas Co.
Pittsburgh

IF our program is on schedule, we have sold top engineers and management on the economics of cathodic protection and are assured of cooperation "down the line" in installing and maintaining the system. So we are squared away with our own company.

But what about the other utilities that have underground structures in the same streets and across the same front lawns that we have? Any change in our system will surely affect the others since, at times, only inches separate the plants in the ground and they are actually tied together in the buildings through gas hot water heaters and building structure. To cite an example: a building contractor prefers to put all utilities in one ditch—a steel gas service, a copper water service, and lead sheath telephone cable.

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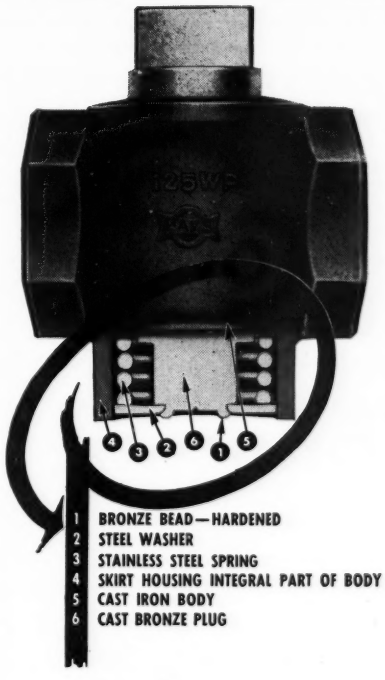
FEATURES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- Precision Ground Plug and Body—Matched for Perfect Seating.
- Lubricated with a Compound of Greases—Suitable for Use with Manufactured, Natural or Liquid Petroleum Gases.
- Spring Tension Allows Free Turning and Reseating of Plug in Body.
- Individually Tested Under Rigidly Controlled Inspection.
- Flow Way Equal to Rated Capacity of Domestic Consumer Meters.
- Obtainable in a Variety of Patterns.

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Flat Head With Check
Flat Head With Lock-Wing

Sizes; ¾"—1"—1¼"—1½"—2"

Also HAYS STANDARD
HEAVY PATTERN IRON BODY GAS STOP

For 75 Years the Gas Industry has relied on HAYS Iron Body Gas Stops

Now, the gas company wants to install a magnesium anode to protect its service line.

Cooperative Surveys

To avoid future complications and to save money, the engineers and operators of other underground structures should be consulted and informed of our plans. Cooperative surveys of existing plant and comparison of leak records and failures will indicate many areas for joint installations of cathodic protection. This can mean a real saving because joint installations mean shared costs.

Perhaps the other companies are already enjoying the benefits of cathodic protection. They too should be informed so that the balance they have attained will not be disturbed.

If the other companies will not or cannot believe in cathodic protection, of course, they cannot be included in any cooperative plan. However, they must be informed of our intentions. In some cases, it may even be necessary to prove by before-and-after tests that their structures have not been harmed by our installation.

In Design Stage

For greatest economy, this consulting with others should be done in the drawing board stage. The utilities have a common problem, whether they are protecting steel, cast iron, lead, or copper since they are all buried in the same corrosive soil and subject to the same stray currents. This common enemy, corrosion, makes cooperation easy to sell.

An outstanding example of what can be accomplished by close cooperative effort is the installation in downtown Miami, Fla. All of the buried metallic structures in the business district of Miami covering an area of approximately one square mile are under cathodic protection as a unit. This includes electric, telephone and Western Union cable sheaths, and high and low pressure water and gas mains and services.

Pittsburgh Organization

In Pittsburgh, we have an electrolysis committee for companies who have buried structures in Allegheny county. These include representatives from three gas companies, four oil companies, five water companies, two electric companies, two railroads, a street railway, Bell Telephone, American Telephone & Telegraph, Western Union, the City of Pittsburgh, and Allegheny county. They report all extensions and changes in their plant at monthly luncheon meetings and invite all parties affected to meet with them to work out a mutually satisfactory solution. Copies of the minutes of each meeting are mailed to all members. The committee has been in existence for 19 years and, although there is a wide divergence of opinion, we do not have on the books a single stalemate. Cooperation *is* possible.

So, for a better job done more economically, we will do better to consult all those affected and push cooperative efforts.

(To be continued)

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PEOPLE

F. S. Wade

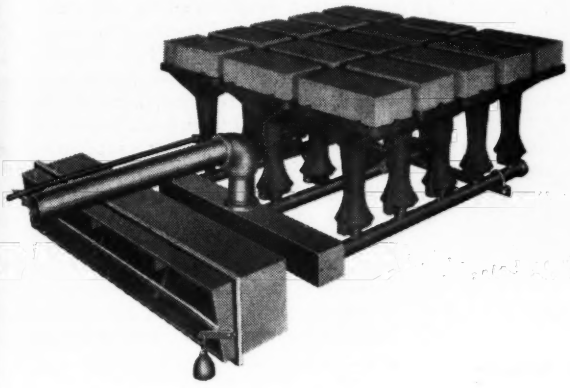
F. M. Banks

F. S. WADE, president of Southern California Gas Co., Los Angeles, and LeROY M. EDWARDS, vice president and special counsel, resigned their positions Aug. 1 to retire under the company's pension plan. Mr. Edwards also resigned as vice president and general counsel for Southern Counties Gas Co. and as vice president and general manager of Pacific Lighting Gas Supply Co., both SoCal affiliates (see below). The two men continue as directors of SoCal, and Mr. Wade was elected chairman of the board, and will be available in an advisory capacity. Mr. Edwards will practice law and will be retained by SoCal and SoCounties as special counsel. F. M. BANKS, who became vice president and general manager in August 1949, has been elected president. Mr. Banks has been a vice president and director of the company since 1934, and he held a series of executive positions before that.

L. M. Edwards

LeROY M. EDWARDS retired Aug. 1 as vice president and general manager of Pacific Lighting Gas Supply Co., Los Angeles. At the July meeting of the board of directors ROBERT A. HORNBY was elected executive vice president; MARION L. FORT, former general superintendent, was elected vice president and general superintendent, and C. E. PEARMAN, treasurer and comptroller, was elected vice president and treasurer. RAYMOND W. TODD, chief engineer, replaces Mr. Edwards on the board of directors.

GEORGE H. BLAKE, president, Public Service Electric & Gas Co., Newark, has announced the following changes in the company's gas department, effective July 1: CHARLES R. DEWHURST from assistant engineer of construction to superintendent of industrial relations; JEAN H. MILLER, from superintendent of distribution, Trenton district, to assistant engineer of construction, general office; GERALD E. LOUSTALOT, from assistant superintendent of distribution to superintendent of distribution, Trenton



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- INTERCHANGEABLE PORTS
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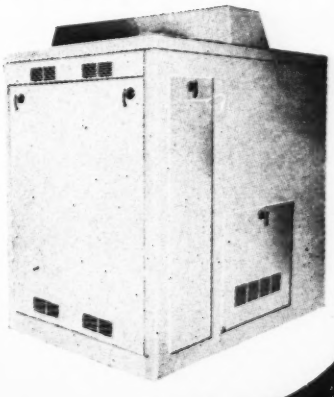

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Forced air and gravity, Gas Circulators — Unit Heaters — Panel Heaters — Wall Heaters — Radiant Heaters.

Radiant and plain front fully vented models.
20,000 to 60,000 B.T.U. sizes.
Manual or Automatic Controls.
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district; JOSEPH S. HOPKINS, from superintendent of distribution, Newark district, to assistant engineer of distribution, central division; JOHN A. LANE, from superintendent of distribution, Summit district, to superintendent of distribution, Newark district; JAMES C. COSTELLO, from assistant superintendent of distribution to superintendent of distribution, Summit district; FREDERICK C. SCOFIELD, from assistant superintendent of distribution, Orange-Montclair district, to the same position in Summit district; WILLIAM L. HEUSER, from general foreman to assistant superintendent of distribution, Newark district, and WILLIAM MAURER, from assistant general foreman to general foreman, Newark district.

CLARENCE E. MUEHLBERG has been appointed sales manager of gas products for the meter and valve division of Rockwell Manufacturing Co., Pittsburgh. He has been in the gas utility field for 30 years and in 1947 was admitted to the AGA Court of

C. E. Muehlberg

L. A. Dixon Jr.

Flame for outstanding contributions to the industry. L. A. DIXON JR. has been named assistant vice president of the same division. For the past two years he has been general manager of Rockwell's Pittsburgh-DuBois division.

CHARLES F. GAUT and HOWARD W. RUEMMELE have been elected assistant treasurers of Equitable Gas Co., Pittsburgh. ROY E. ADAMS has been appointed purchasing agent for the company, and A. E. DIBLE has been named superintendent of automotive equipment. SAMUEL E. CLANEY has been appointed personnel director, and JOHN H. HAYES is assistant personnel director. The company also appointed two attorneys—JOHN T. BROWN, and WILLIAM J. POWELL, both of Pittsburgh.

H. L. BILSBOROUGH, assistant marketing director of A. O. Smith Corp.'s domestic water heater division, has been assigned to head water heater sales in nine western states. Mr. Bilsborough will headquarter in Los Angeles.

HENRY P. ISHAM, president of Clearing Industrial District Inc. of Chicago, and a director of a number of banks and corporations, has been elected a director and member of the executive committee of Dresser Industries Inc.

WILLIAM R. MABEE, plant superintendent of Tappan Stove Co., Mansfield, Ohio, since 1945, has been elected vice president and assistant general manager of the firm. All other officers of the company were re-elected by the board.

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PERFECTION Automatic Gas Water Heaters are sales-getters! That's a fact proven by utilities who push Perfection. These quality water heaters give 24-hour hot water service, day after day, year after year . . . with minimum service and maximum satisfaction. That means your customers get their money's worth and more. When you put your sales efforts behind PERFECTION you build not only sales but good-will as well!

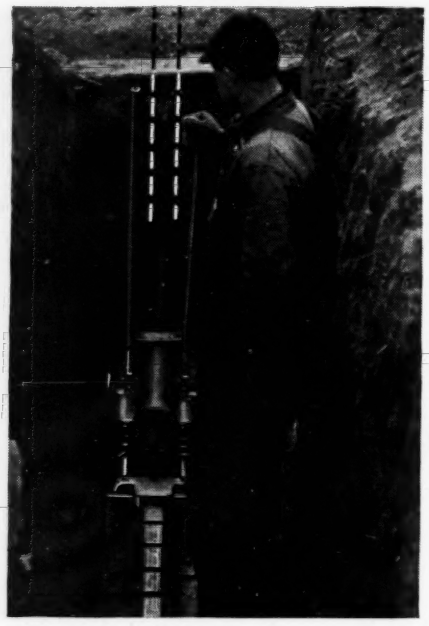
Designed and manufactured by Combustion Engineering—Superheater, Inc., PERFECTION Automatic Gas Water Heaters are backed by the reputation of one of the biggest boiler companies in the world. C-E's background of experience applied to PERFECTION results in a fully automatic gas water heater that dollar for dollar, feature for feature can't be beat!

To complement your sales efforts, C-E has prepared a full-scale advertising and merchandising program that includes point-of-sale material, mats for your own local advertising, direct mail pieces . . . all ready for your signature!

And the PERFECTION line is designed for use with Natural, Manufactured, or Liquefied Petroleum gases. Capacities for every family requirement . . . from 20 to 75 gallons, plus a high recovery, multi-flue, Booster Type designed for use where an extremely large and constant supply of hot water is necessary.

Get set for more sales! We'll be glad to give you full details on the PERFECTION merchandising plan. Your copy is ready . . . write us today! PUSH PERFECTION!

PUSH PIPE
UNDER STREETS, WALKS,
TRACKS, FLOORS



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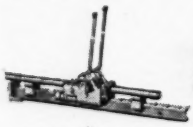

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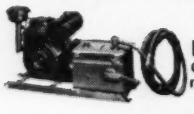

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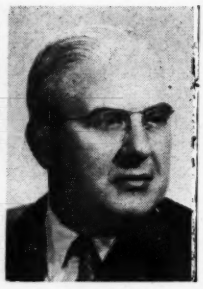
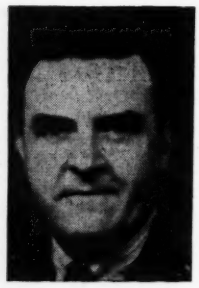
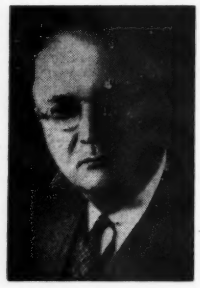


Frank H. Hughes
... ANGSCo.



R. E. Ginna
... RG&E



Carl H. Reker
... Ebasco

Fordyce C. Hauber
... Con. Natural

FRANK H. HUGHES has been appointed director of purchases of American Natural Gas Service Co., Detroit. Mr. Hughes has been engaged in public utility purchasing for the past 24 years. American Natural furnishes technical services to its affiliates, Michigan Consolidated Gas Co., Michigan Wisconsin Pipe Line Co., and Milwaukee Gas Light Co., and to its parent, American Natural Gas Co.

ROBERT E. GINNA, former vice president in charge of sales and regulatory matters for Rochester (N.Y.) Gas & Electric Corp., has been named executive vice president, a new position. Other promotions include ERNEST J. HOWE, who adds comptroller to his title of vice president in charge of finance, and LEO H. EAST, former general superintendent of the gas division, who is now vice president in charge of operations.

J. N. SHRADER, assistant personnel manager of Southern California Gas Co., Los Angeles, recently was appointed manager of the company's Northern division. Functions of the compensation and safety departments have been combined with personnel, and Mr. Shrader's former position has been replaced by two new ones. A. W. TURNER has been named supervisor of personnel and J. M. HUFTY is now supervisor of employee relations. Vice President and Personnel Manager W. R. DAVIS heads the entire department.

BATTLE BELL has been named by Handley-Brown Heater Co., Jackson, Mich., to promote sales of conversion burners and water heaters in Alabama, Mississippi, and Tennessee. Mr. Bell's experience includes eight years with southern utilities and 14 years calling on utilities and jobbers as a manufacturers representative.

H. WAYNE THOMPSON has been appointed manager of the Bangor, Me., division of the Citizens Utilities Co., Greenwich, Conn. He replaces R. A. PRITCHARD JR. Mr. Thompson was associated with Stone & Webster Service Corp. for 10 years, and for 16 years was manager of Shippensburg and Waynesboro Gas companies in Pennsylvania.

STANLEY J. PACHYN has joined the Combustion Control Corp., Cambridge, Mass., as assistant sales manager with headquarters in Chicago. RODY G. CAPRON has been named west coast sales manager, and he will be located in San Francisco. DANA FISHER has been transferred from the Cambridge to the New York sales office.

CARL H. REKER, a general consultant of Ebasco Services Inc., New York, has been elected a member of the company's board of directors. Mr. Reker joined the organization in 1929.

FORDYCE C. HAUBER has been appointed system production and reserves engineer for Consolidated Natural Gas Co. and ROBERT E. BAYLES has been named chief stratigrapher for the company. The Peoples Natural Gas Co., Pittsburgh, a Consolidated subsidiary, announced that GEORGE C. GROW has taken over as chief geologist for that company. Another Consolidated subsidiary, New York State Natural Gas Corp., recently made a joint announcement with Peoples Natural concerning the North Oakford, Pa., storage project being planned by these companies and Texas Eastern Transmission Corp. SIDNEY S. GALPIN will be production geologist and engineer on the project. EDWARD C. INGHRAM is general supervisor and CARL A. SPENCER is district superintendent.

J. E. BROWN (right) and ELMER G. TRIMBLE, affiliated with Rockwell Manufacturing Co., Pittsburgh, for 44 and 48 years, respectively, both retired recently. Their parallel careers began at the Pittsburgh Meter Co. in East Pittsburgh. When that company was merged with Equitable Meter Co. in 1926 both men were moved to the new Pittsburgh headquarters. At the time of their retirement Mr. Brown was assistant to the vice president of sales and Mr. Trimble was assistant Pittsburgh district manager.

L. M. TIBBALS, a 23-year Lone Star Gas Co. employee, Dallas, has been appointed manager of the Sherman, Texas, district, succeeding the late W. W. SIMPSON. Lone Star also has named WANDA LOUISE JONES Oklahoma division home economist.

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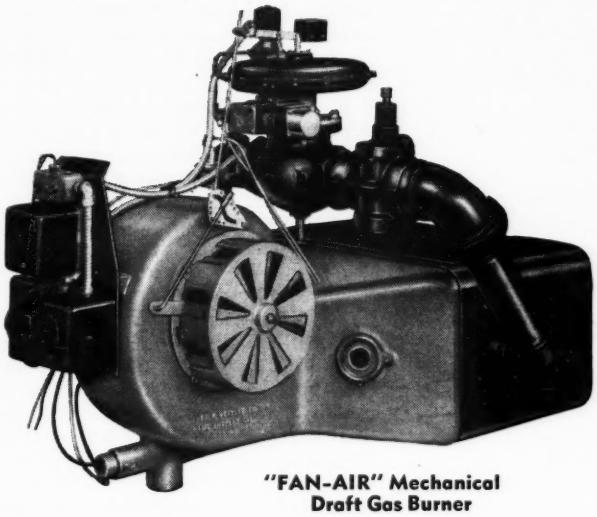

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BOTH NEW (1950 Model) FAN-AIR & Type "C" Burners pictured here represent the most modern & advanced fully automatic assemblies. NOT JUST gas burners BUT complete BURNER SYSTEMS, factory tested & ready for application, when received. Each embody dependable spark ignited rectifier safety pilots with Flame Safeguards, 100% shutoff plus throttling & On-Off fuel controls. Why be satisfied with less when all these tangible advantages are so readily available.

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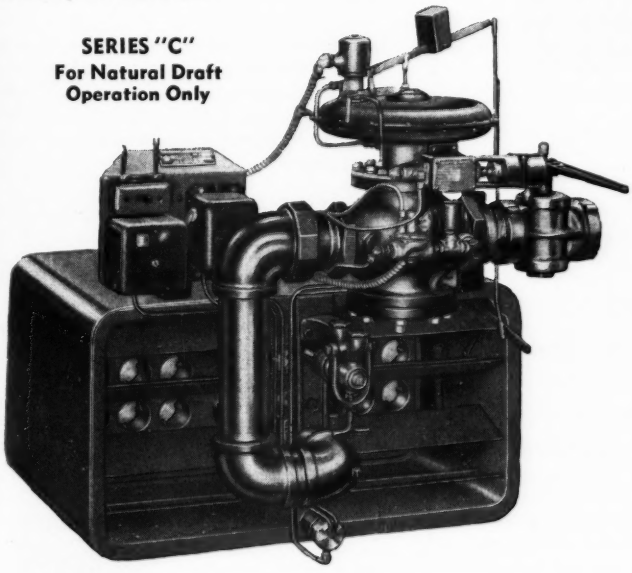
For Natural Draft Operation Only



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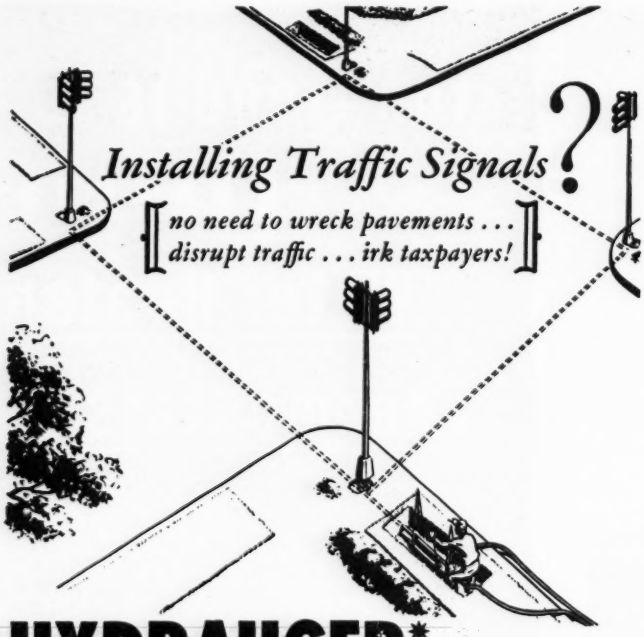

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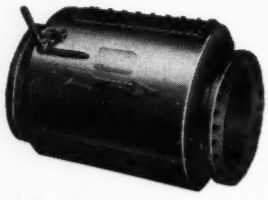

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MAX D. HOWELL has been elected vice president and treasurer of U. S. Steel Corp. effective July 1. He was formerly assistant to president, vice president, secretary and treasurer of U. S. Steel Corp. of Delaware. Mr. Howell joined the organization in 1937 as vice president of Carnegie-Illinois Steel Corp. at Pittsburgh. PAUL C. VAN CLEAVE was elected vice president, sales, of U. S. Steel Supply Co., also taking over July 1. Mr. Van Cleave, who had been district manager of the company's Los Angeles warehouse, succeeds MARCUS J. AURELIUS, recently elected vice president, sales of Columbia Steel Co., another U. S. Steel subsidiary.

J. N. BETZ has been appointed district sales supervisor of Cumberland & Allegheny Gas Co., with headquarters in Cumberland, Md. He had been district sales supervisor of The Keystone Gas Co. Inc., Olean, N. Y. MISS PATRICIA ANN HANNAH has been named home economist for the company in the Elkins, W. Va., territory.

EDWIN S. BRYANT, assistant superintendent of the Long Beach (Calif.) Municipal Gas Dept. since 1928, retired last month. The Long Beach department acquired its properties from Southern Counties Gas Co., Los Angeles, in 1923, at which time Mr. Bryant became engineer of design.

D. P. HARTSON, vice president and general manager of Equitable Gas Co., Pittsburgh, has accepted chairmanship of the corporations and special gifts committees for the United Negro College Fund of Pittsburgh in the 1950 drive. Thirty-two private Negro colleges in the South and East will benefit.

MISS MARGARET EASLEY, home service director of the Binghamton (N.Y.) Gas Works, has been appointed director of cooking schools conducted in five states by the Columbia Gas System. She has been succeeded by MISS JANE MARSHALL.

CHARLES J. RAMSBURG JR. has been appointed manager of sales, welded products, for the Spang-Chalfant Division of The National Supply Co., Pittsburgh. He had been Pittsburgh district manager for the division since January.

- OBITUARIES -

Otto Mauthe

OTTO C. MAUTHE, 45, manager of publications for Southern California and Southern Counties Gas Co.'s, Los Angeles, died June 25. Mr. Mauthe had been in a coma since June 1949, following a stroke. He was engaged in publicity and press relations work throughout his 17-year career with the Los Angeles utilities. In 1929 he became a reporter on the *Wall Street Journal* in San Francisco and remained on the staff of that newspaper until joining the So-Cal-SoCounties organization in 1933.

FRANK P. LAMB, 49, superintendent of distribution, Washington (D.C.) Gas Light Co., died on June 6. Early in his career he was associated with Allentown-Bethlehem Gas Co., Consumers Gas Co., and the Pennsylvania Public Utilities Commission.

THOMAS V. FLYNN, who retired from Philadelphia Gas Works Co. in April 1948, died June 16 after a brief illness. He joined the company in 1903 as a fitter and was superintendent of the street division at the time of his retirement.

RALPH SHAW, superintendent of right-of-way and claims for Lone Star Gas Co., Dallas, died on July 6.

TRADE LITERATURE

WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J.—Bulletin W-200-B1 discusses this company's surface condensers and auxiliaries. Chapters are devoted to surface condenser design, methods of installing condenser tubes, and construction of various types and sizes. Auxiliary equipment described includes circulating pumps, vertical turbine pumps, steam-jet ejectors, thermostatic control for condensate recirculation, steam turbines, and steam power equipment.

THE SERVICE OF SELLING—by Kenneth Lawyer, Western Reserve University. Published by The Cleveland Heater Co., 2310 Superior Ave., Cleveland 14, Ohio. This series contains three books: Volume I, *The Principles of Salesmanship;* Volume II, *The Selling Process;* a companion volume, *Enthusiasm, Personality and Friendships.* Price of the set: $4.

SELAS CORP. OF AMERICA, Philadelphia —A new bulletin describing Flo-Scopes, air and gas flow rate indicators with improved design, has been issued and is available from the manufacturer. Flo-Scopes, individually calibrated for the characteristics of the gases to be measured, are used with combustion equipment and in chemical plants when accurate data about gas-air mixtures are required.

U. S. RADIATOR CORP., Detroit 31, Mich. —"Baseboard Heating" is the title of a 34-page book presenting this company's radiant baseboard system which was introduced in 1949 after three years of development and testing. Every page contains photographs, charts, or drawings which supplement the explanation of the system.

THE GAS MACHINERY CO., 16100 Waterloo Rd., Cleveland, Ohio — A new four-page bulletin on rotary hearth furnaces will be sent free upon request. The catalog outlines economy features; lists capacity, heat input, and air required for forging, annealing, or drawing operations.

PITTSBURGH EQUITABLE METER DIVISION, Rockwell Manufacturing Co., Pittsburgh 8, Pa.—A 12-page technical bulletin on the company's instrument pressure control system has been issued. Operation, application, and installation of the system are discussed.

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HARRISBURG STEEL CORP., Harrisburg, Pa.—Bulletin 466 presents the firm's line of "Lite-Weight" propane cylinders. Also illustrated are four principal manufacturing operations on the cylinders: automatic welding with submerged arc, cold drawing heads in mechanical press, annealing furnace operation, and valving and loading cylinders into cars with a new bracing and blocking technique.

HAGAN CORP., 323 Fourth Ave., Pittsburgh, Pa. — Two new bulletins have been issued. No. 2150 describes and illustrates the meter type differential master sender, a pneumatic machine used as the metering element in the measurement and control of steam, gas, and liquid flow, liquid level, pressure differential, and similar applications. Bulletin 2250 discusses the differential pressure transformer for measuring differential pressures for indicating, recording, and controlling the rate of flow of steam, gas, or liquid fuel, water, and other materials.

VULCAN RUBBER PRODUCTS INC. (formerly Vulcan Proofing Co.), 58th St. and 1st Ave., Brooklyn—Bulletin No. 11 discusses rubber and synthetic rubber coated fabrics for industrial uses and introduces some new fabrics and coatings. The catalog gives detailed specifications, including 10 variations under premier coatings, a wide choice of neoprene coated fabrics, coated Fiberglas, Buna-N coatings on nylon and cotton fabrics, etc. Also listed are special purpose coated fabrics, Hycar, neoprene and natural rubber sheet stocks, uncured coated fabrics, and uncured rubber stock.

CURRENT READING

RESEARCH BULLETIN 55, "Investigation of Primary Air Injection by Use of Variable Chamber Pressures"—Published by the AGA Laboratories, this bulletin covers results of work performed as part of Project DGR-2-B, a PAR plan activity.

This project was primarily concerned with the development of a quantitative understanding of the effects of combustion chamber pressures on primary air injection. To obtain such an understanding, it was necessary to develop fundamental concepts of normal primary air injection by applying the momentum theorem to flow in the mixer tube of a burner. Basic relationships for primary air injection were derived with the comparatively new idea of equating momentum of the gas jet with the momentum of the flow stream at that cross-section of the mixer tube at which the static pressure equals zero with respect to the atmosphere.

An equation was also derived indicating the quantitative effect of combustion chamber pressure on primary air injection. This equation was based on the observed straight line relationship between burner head pressure and combustion chamber pressure. The range of chamber pressures investigated extended from +0.2 in. to —0.2 in. w.c. Characteristic flame limits of a fuel gas such as lifting, yellow tipping and flashback were not affected by chamber pressures in the above range of pressures.

This is the 16th bulletin dealing with gas burner design research published by the laboratories. Price of the publication is $1.

GAS-OIL BURNERS FOR FORGE HEATING—AGA Industrial & Commercial Gas Section Information Letter No. 37 issued by the metals committee and prepared by Charles C. Eeles, The Ohio Fuel Gas Co., Toledo. The letter describes the operating characteristics of gas-oil burners in their applications for forge heating and concludes with the observation that this type of firing offers gas the opportunity to obtain 50 to 75% of the forge heating load to which slot, rotary, or conventional continuous furnaces are best adapted, thus opening a tremendous new market to gas.

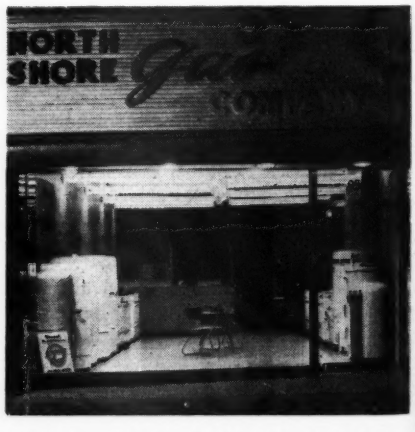
COMPRESSED AIR POWER—Prepared by the Committee on Engineering Education, Compressed Air & Gas Institute, 1410 Terminal Tower, Cleveland, Ohio. This 18-page booklet, containing extensive basic reference data on compressed air and gas power, has been designed as a general non-technical review of the application of compressed air and gas theory to actual machines and uses. Free copies are available from the secretary of the committee.

THE OIL PRODUCING INDUSTRY IN YOUR STATE—Published by the Independent Petroleum Assn. of America, P. O. Box 1019, Tulsa. The book contains complete statistical information on all phases of the oil industry in 26 producing states, as well as charts and graphs which deal with national economic trends in the industry. Copies of the 62-page book, which is an expanded revision of a 1941 edition, will be furnished upon request.

UNIVERSAL ATLAS CEMENT CO., Lumnite Division, Chrysler Bldg., New York—A revised edition of the booklet "Lumnite Refractory Concrete" has just been published. Including the latest available information on refractory and heat-resistant concrete, it is a how-to-do-it manual. Proper types of refractory concrete for a wide range of temperatures and insulating conditions may be selected from the tables contained in the bulletin.

PART III OF THE RECOMMENDED Practices for Refinery Inspections—Published by the American Petroleum Institute, 50 W. 50th St., New York. This is a new handbook covering the inspection of fire protection equipment in oil refineries and is part of a continuing project. Price: $1.

AMERICAN STANDARD SAFETY CODE for Identification of Gas-Mask Canisters—Available from the American Standards Assn., 70 E. 45th St., New York. Two new gases—hydrocyanic acid and chlorine—have been included in this revised code, designated K12.1-1950. Price: 35 cents.



Here's how North Shore Gas Co.'s Winnetka (Ill.) office looks following a complete remodeling job. In addition to its pleasing face, the office has gas-fired air conditioning. Clever designing gives an illusion of greater width to the 18-ft wide area.

GAS CLASSIFIED

Classified advertising is set in 6-point type, without border or display, at the rate of 15 cents per word per insertion; minimum charge per insertion $3. Box numbers for replies count as 5 words. Count as a word each one letter word and each group of figures. Classified advertising is only accepted when payment accompanies order. Copy and payment must reach publisher's office prior to 10th of month preceding publication.

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HELP WANTED: EXPERIENCED RATE MAN, BY large natural gas Interstate pipe line company located in the Middle West. Must be accurate, have a pleasing personality and get-along ability. In reply state education, experience, age and salary required. Box 125, GAS Magazine, 198 S. Alvarado St., Los Angeles 4, Calif.

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FARMING ON THE PIPELINE

By cultivating right-of-way, Texas Gas minimizes soil erosion, keeps farmers happy.

By J. W. CARNEAL

Last March, Texas Gas Transmission Corp., which in 1949 virtually completed construction of its Texas-to-Ohio gas pipeline, announced it was going into farming on the side. Or, more accurately, on the right-of-way. The world's longest, narrowest "farm"—50 ft wide and 800 miles long—was to be cultivated to block erosion and to keep landowners happy.

How this program is carried out is told here by the man who is running it—J. W. Carneal, chief soil conservationist for the company.

Mr. Carneal was graduated from Murray (Ky.) State College in 1940 with a B.S. degree in agriculture. In 1946 and 1947 Mr. Carneal did graduate work in soils at the University of Kentucky. For two years he was a partner and supervisor with Enlow, Brewer & Co., farm contractors at Hodgenville, Ky. For two and a half years prior to 1949 Mr. Carneal taught agriculture to veterans engaged in on-the-farm training programs, and subsequently served as agricultural training officer for the Veterans Administration in Louisville. Mr. Carneal joined Texas Gas in June 1949.

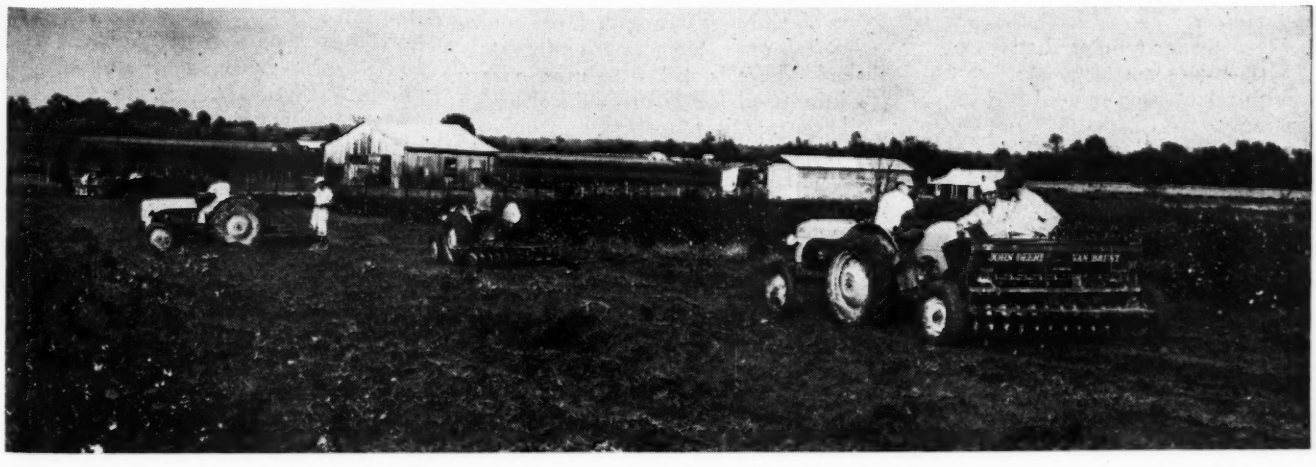
THERE is something new in pipeline work: pipeliners are becoming farmers and farmers pipeliners. Veteran pipeliners are learning some of the more modern methods of farming while those concerned with saving soil are learning a vital lesson in pipeline maintenance.

Exclusive

Many of these old-time pipeliners were farm-reared, when the best farmers were judged by how straight they could plow a furrow or plant a row of corn, regardless of the contour of the ground. When these fields, so farmed, failed to produce abundantly, they "let her lay out a few years," until finally the cycle was repeated. Farm-reared pipeline personnel who have been away from the farm for several years find many changes have been made since they helped "Pop" back on the old home place. And as for farmers becoming pipeliners, it is generally admitted they make the best pipeliners and they certainly fit into the present soil conservation program of Texas Gas Transmission Corp.

The Texas Gas conservation program was organized and set up in June 1949 along the right-of-way of the company's new 26-in., 800-mile natural gas line now in operation from Texas to Ohio. The program was organized primarily to reduce the cost of pipeline maintenance by a carefully planned, scientific effort to spur conservation measures and control soil erosion.

Another objective was to improve relations with landowners by instituting a program that is mutually beneficial to the farmer and to the company. Thus far, the program has been successful. Farmers understand what is being done. Initially, they were rather mystified by construction and sometimes left unhappy by it. But now that the seeding and terracing program has begun, and has been given a chance to prove itself, they are proving themselves friends of



A TEXAS GAS soil conservation crew seen in the field along the right-of-way of the comany's new 26-in. pipeline in Tennessee.

EQUIPMENT used by a Texas Gas soil conservation crew is checked along the right-of-way of the company's new 800-mile pipeline.

the company. Another result, which was not considered as an objective at the time the program was instituted, is the help that trained agriculturists can give to personnel of other departments in problems involving technical agriculture. Our soil conservation personnel spend an average of three to five days each month with representatives of the land department in settling claims and damages to farms, livestock, and crops.

Our department is composed of trained agricultural personnel and includes one chief soil conservationist and two assistant soil conservationists. The labor for the program is furnished by regular maintenance crews located from 60 to 80 miles apart. Equipment for each crew consists of:

1 one-ton flat bed truck (standard maintenance equipment).
1 two-wheel, tilt top, flat bed, farm-type trailer, that may either be used behind truck or tractor.
1 farm-type tractor with the following accessories:
  1 disc harrow hydraulic lift type, for ease in crossing pavement, creeks, etc.
  1 terracing blade or terracing plow.
  1 scoop for moving dirt.
  1 mowing machine.
1 Cultipacker, used in seed bed preparation.
1 grain drill.
6 hand seeders.

The program is designed only to cover land subject to erosion, for it is axiomatic that it is more expensive to rebuild eroded land than to prevent its washing away. Flat, level land not subject to erosion receives no treatment. Our work is not necessarily designed to reduce the cost of damage and claim settlements, although it has proved beneficial in that respect, but to protect those areas needing erosion control measures through which our pipelines pass.

The varieties of small grains, grasses, and legumes seeded, the type and number of terraces constructed, and the fertility program for each state or soil type have been carefully worked out in collaboration with the U. S. Soil Conservation Service, state agricultural extension services, vocational agricultural teachers, state agricultural colleges and experiment stations, and farmers, as being the best for a particular location.

The property owner is contacted before any conservation work is done on his farm and his cooperation solicited. After the program is explained and the farmer's cooperation assured, he is informed of the varieties of seed and amounts to be sown, and also the fertility program that will be followed. This basic treatment is, of course, undertaken at the expense of Texas Gas.

Basic Treatment

Last fall approximately 1750 acres were seeded with grasses and small grain mixtures. This spring legumes were added in the grass seeded last fall. In addition, approximately 400 to 500 additional acres have been seeded to a permanent mixture of grasses and legumes. This permanent seeding will continue as long as the season permits. The program will be continued in the fall and at the close of the fall season it is anticipated that all land subject to erosion will have received a once-over basic treatment.

We realize that all areas receiving this initial treatment will not hold the first time, and will require reseeding and terracing. Failures will result from severe weather conditions, and farmers permitting overgrazing and the running over of new terraces with farm equipment before the terraces are fully established. There is still, of course, a very definite need for farmer education on soil conservation measures not only on our pipeline right-of-way, but throughout the United States.

Once all the land subject to erosion on the right-of-way has received basic soil conservation treatment at company expense, it is expected that farmers will take over.

It is not the intention of Texas Gas to terrace, re-seed and fertilize the rights-of-way each year because the farmer has plowed up the work we have accomplished for a cultivated crop. These operations will be confined to areas where repairs are necessary.

However, the soil conservation department will be happy to work with farmers on soil conservation practices and explain methods of soil conservation, pointing out how terraces, diversion ditches, contour cultivation, strip cropping, cover crops, permanent pasture, and proper rotations will benefit the farmer and the land. Also, we will explain what local agricultural services are available and how to go about procuring them. If we can show the farmer how he will profit by an increased yield from his farm through proper soil conservation and improved farm practices, we feel both he and the company will benefit.

The farmer may plant any crop he desires on the right-of-way and he may graze or cut for hay any seedings we have made. He is asked not to overgraze the seeded area until it becomes well established. Overgrazing is one of our major problems. Not because of the uncooperative attitude of the farmer, but in many cases because of his inability to do much about it.

It was difficult to estimate the amount of capital that would be needed for such a program. It had never before been attempted so there were no records available for study. It is easy enough to compute rather accurately the amount of material necessary for an acre of any type seeding, but the labor involved is something else. At the beginning of the project warehouses had not been established, or did not meet our needs. Crews had to be employed and equipment purchased. Then the crews had to learn the proper techniques, which took time and slowed down progress. The men traveled an average of 60 miles each day to and from work. There were numerous fences, creeks and rivers that required much time to traverse.

Inflated Costs

Actually, our cost is somewhat inflated. The average cost as computed at the close of the 1949 season in the five states in which we worked is shown below. Only a portion of Louisiana and Indiana were cleaned up at that time and no work had been accomplished in Texas and Ohio beyond preliminary planning.

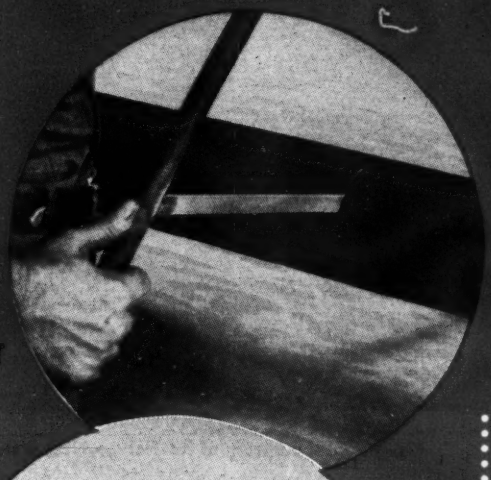
Total miles	286.12
Average cost per mile	$201.67
Total acres	1731.7
Average cost per acre	$32.29

We have heard a considerable amount of favorable comment on the program. And, of course, there was some skepticism. We are confident, though, that rewards have far offset costs, and that Texas Gas will continue to reap benefits—for 10 years and more—as a result of the initial operation only.

For quick SHUT-OFFS

SLOT

1. SAW SLOT



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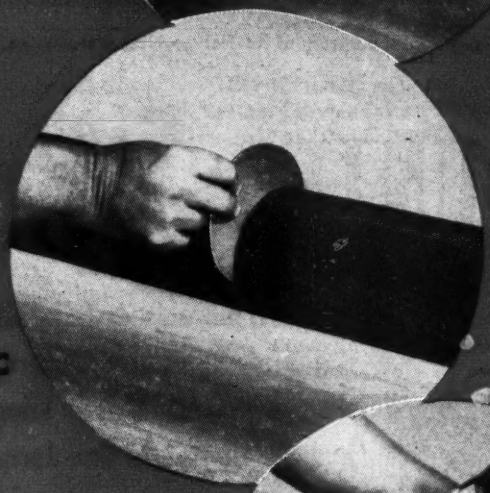

CLAMP

3. APPLY CLAMP

4. When ready to resume pressure, loosen clamp, remove disc, install brass band, re-center clamp, tighten — and you're through!

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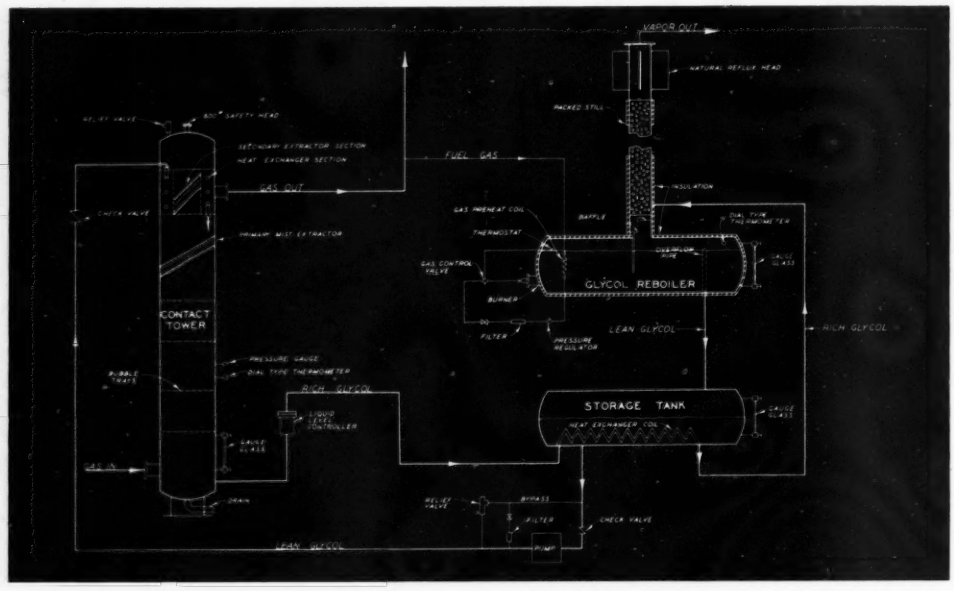


Fig. 1. Flow diagram of Kettleman Hills installation.

A SKID-MOUNTED Glycol Dehydration Plant

Low-cost, movable drying unit has proved itself in the job of removing moisture from natural gas taken from Kettleman Hills oil fields in southern central California and distributed to San Joaquin valley communities.

A skid-mounted gas dehydration plant, employing triethylene glycol as the liquid absorbent, has recently been installed by the Southern California Gas Co. at its Kettleman Hills station. The use of such units with triethylene glycol as the dehydrating medium is a new development in the dehydrating of gas. The relatively low cost, simplicity of installation and operation, portability, economy, and satisfactory results obtained are factors that have made this type of plant a very satisfactory solution to our problem and one that can be recommended for investigation by others. This discussion covers installation, operation, and performance of the plant.

The plant was installed for the primary purpose of removing moisture from the Kettleman Hills gas that is delivered to the San Joaquin valley area of California for customer distribution. In addition to preventing the formation of gas hydrates, increasing pipeline efficiencies, and controlling the problems of corrosion due to the accumulation of water in the pipelines (factors which are usually sufficient to justify the expense of gas dehydration), it was also desired to prevent the entry of water into the distribution lines in the areas served and reduce the number of service orders attributed to this cause.

The gas received at the Kettleman Hills station is obtained, for the most part, from oil company absorption plants in the field. The average analysis of the gas is about as follows: carbon dioxide, 0.3%; oxygen, 0.1%; methane, 87.3%; ethane, 11.9%; and nitrogen, 0.4%. Heating value averages 1100 Btu and specific gravity 0.620. The temperature, when the gas reaches the station, varies from approximately 60° F in the winter to 90°F during the summer months.

The greater portion is used to supply the major transmission lines extending to the north and south. However, quantities as high as 25 MMcf per day are delivered through approximately 25 miles of 10-in. transmission line to distribution lines through which it is served to customers in the Hanford and Visalia areas of the San Joaquin valley. Ground temperatures below 50°F and atmospheric temperatures in the low twenties are not unusual during the winter in this district.

Pressure reduction at the point of service is usually accomplished in two stages. A high-pressure regulator is used to reduce the pressure from approximately 300 psig to 30 psig. The second-stage regulator then reduces pressure from 30 psig to appliance pressure. Both regulators are generally located above ground and exposed to the temperature of the atmosphere as well as to the drop in temperature caused by pressure reduction. During past winters a considerable number of "no-gas" orders, caused by freezing in the high pressure regulators and swollen regulator seats have been received. These have usually been attributed to moisture in the gas. In a number of instances free water was reported to have been blown from service lines. It was to remedy this situation

By L. HARMAN PEAHL

Mr. Peahl is an engineer at the Kettleman Hills plant of Southern California Gas Co., Los Angeles. This paper was originally presented at the Pacific Coast Gas Assn. transmission conference last May in Santa Maria, Calif.

that dehydration of the gas was considered essential.

Two-stage partial dehydration has been employed at this location. An atmospheric cooling tower, containing gas heat exchanger sections, is the first stage. However, the amount of cooling obtained in this manner is limited by the temperature at which gas hydrates are formed and restrict the flow of gas through the tubes. This generally occurs at approximately 53°F at 400 psig. In the past, the second stage consisted of a direct contact plant in which the gas was cooled by direct contact with urea solution, which had previously been cooled through atmospheric sections in the cooling tower. With change in operating conditions, greater water removal capacity than that afforded by the existing plant was required.

TABLE 1. SUMMARY OF OPERATING DATA

	Unit No. 1	Unit No. 2	Average Per Unit
Pressure (Psig)			
Contactor	385	385	385
Temperatures (°F)			
Gas to contactors	55	55	55
Gas from contactors	66	64	65
Dew point out	—4	—4	—4
Dew point depression	59	59	59
Atmospheric			55
Minimum ground			54
Reboiler	353	351	352
Glycol from storage tank	194	194	194
Glycol to contactors	179	171	175
Glycol from contactors	59	59	59
Glycol to heat exchangers	68	66	67
Quantities			
Gas treated (MMcf per day)	11.1	10.5	10.8
Fuel consumed (Mcf per day)			5.5
Electricity used (kwh per day)			33
Glycol circulated (gal. per hour)	133	139	136
Storage tank level (gal.)	70	68	69
Laboratory Analyses			
Water in glycol to contactors (%)	1.72	1.78	1.75
Water in glycol from contactors (%)	3.10	3.00	3.05
Glycol in condensate from stills (%)			Less than .06

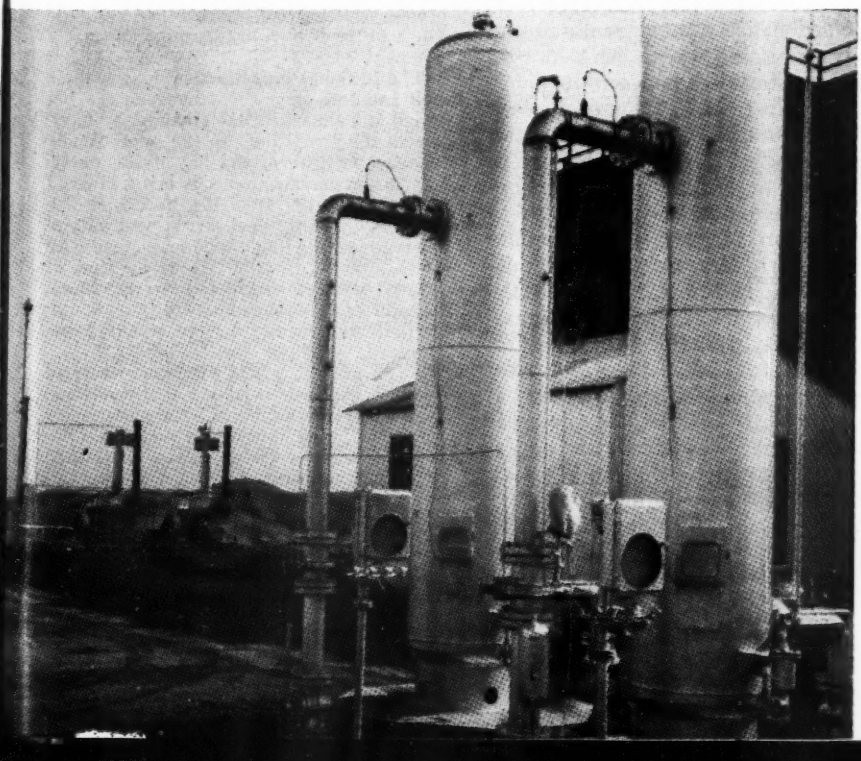
Plant Requirements

In the search for an economical solution of this problem, first consideration was given to the use of glycol as the absorbent, since the trend in gas dehydration during the past decade has been in this direction. Next, it was necessary to consider the type of load and the fact that the volume was variable and subject to seasonal and daily fluctuations. Since it was possible that it might be desirable to relocate the plant sometime in the future, the costs of installation and removal were of considerable importance.

Investigation of the dehydration equipment available disclosed that a low-cost unit, mounted on skids and originally designed for wellhead dehydration, could be obtained in standard sizes ranging from a capacity of 1.6 MMcf per day to 12.6 MMcf per day at 400 psig and 80°F gas inlet temperature. Since the maximum load was expected to be in the neighborhood of 25 MMcf, it was decided to install two of the 12.6-MMcf units with the thought in mind that, if the load should increase or decrease materially, one of the units could be shut down or additional units added as required. This provided the flexibility of operation desired. The fact that the units could be purchased for less than $8000 each, the relatively low cost of installation, and the feature of portability were other items that influenced the selection.

These units are designed to operate satisfactorily with either diethylene glycol (DEG) or triethylene glycol (TEG) as the desiccant. Since triethylene glycol is the more efficient of the two, it was selected for our use. Triethylene glycol is a relatively new compound commercially and has a high boiling point, a low corrosion rate, low volatility and high stability. Its high decomposition temperature of 403.7°F, as compared to 328.1°F for diethylene glycol, permits concentration to more than 98%, which is extremely important from the standpoint of dew-point depression obtained and accounts for its superiority for gas dehydration. The cost, at present, is approximately $2.20 per gal. as compared to $1.83 for diethylene glycol.

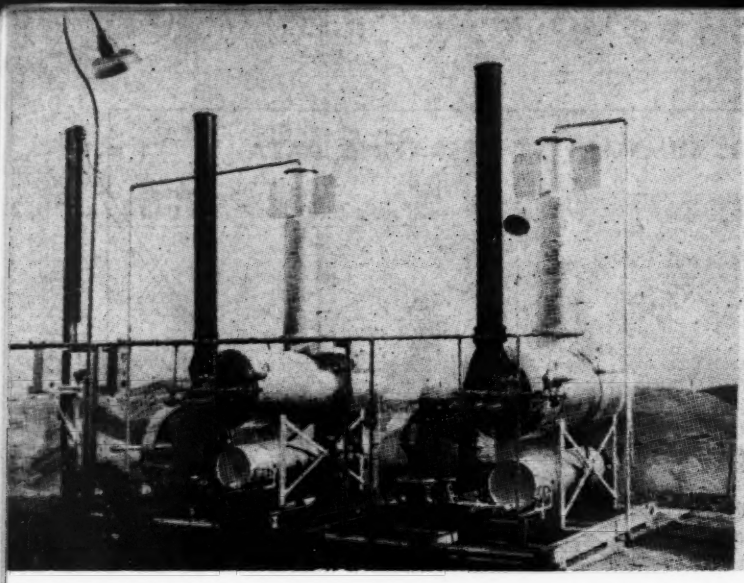
Fig. 2. Contact towers have 36-in. diameters, are 12½ ft. high.



Conventional Designs

Referring to the flow diagram, *Fig. 1*, it may be seen that the basic design of these units is quite conventional. Briefly, the wet gas enters at the base of the contact tower in which it is intimately contacted by a counter flow of glycol. The water-rich glycol is drawn off at the bottom of the tower and reconcentrated in a gas-fired reboiler and still. The water-lean glycol from the reboiler flows into the storage tank from where it is pumped back to the contact tower to complete its cycle. The dry gas leaves at the top of the contact tower and the water vapor passes off at the top of the still.

The contact towers, *Fig. 2*, are 36-in. in diameter and 12 ft 6 in. high. They are of the wetted-wall type and contain four conventional bubble trays with an additional tray in the top to act as a heat exchanger to cool the incoming glycol. Two mist extractor sections are contained within the upper portions of the towers, and glycol cooling coils are built into the top sections where the incoming glycol is cooled by the dehy-



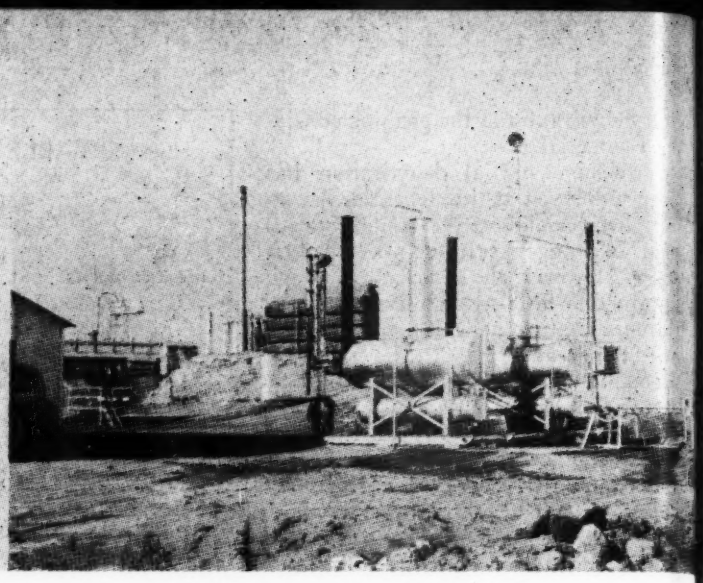


Fig. 3. (left) and 4 (right): the regenerating sections. Sections are each mounted on I-beam skids.

drated gas.

The regenerating sections, *Figs. 3* and *4*, consist of (1) a 30-in. by 8-ft 6-in. gas-fired, fire-tube type solution reboiler, (2) a 12¾-in. by 6-ft 6-in. still column packed with Raschig rings and equipped with a natural reflux head, (3) an 18-in. by 8-ft 6-in., 100-gal. capacity, glycol storage tank which contains a heat exchange coil for the purpose of preheating the water-laden solution enroute to the still column by cooling the regenerated glycol, and (4) a ¾-in. by 2-in. electric motor-driven Worthington triplex solution pump. The regenerating sections are each mounted on three 6-in. "I" beam skids and each section occupies a space 12-ft 3-in. long by 7 ft 6 in. wide.

The contact towers were bolted direct to concrete foundations; however, they may be mounted on skids if desired. Installation consisted of setting the units, connecting the inlet and outlet gas piping, installing the glycol lines to and from the contact towers and installing the gas fuel lines and the electrical connections to the pump motors.

Each unit is installed as a completely independent system and may be operated in this manner. The manufacturer's rated capacity per unit is 12.6 MMcf per day at 400 psig and 80° gas inlet temperature. The rated dew-point depression is 50°F using triethylene glycol. The recommended rate of glycol circulation is 80 gal. per hour. The reboiler heat capacity is 500,000 Btu per hour and the units are designed for completely automatic operation. The burners are thermostatically controlled by the temperature of the solution in the reboilers and the return flow of solution is controlled by traps mounted on the sides of the towers and located so that they will maintain a predetermined quantity of solution in the bottoms of the towers. Relief valves are located in the pump bypass connections to protect the pumps and discharge piping against excessive pressures.

The contact towers are located adjacent to the 8-in. transmission line that carries the gas which is to be treated, and the regenerating sections were installed approximately 100 ft to the east of the towers. The glycol lines, between the towers and the regenerating sections, are buried underground in a common trench. The gas fuel for the reboilers is taken from the dry gas line after it leaves the contact towers. This connection is located approximately 200 ft from the reboilers, toward the operator's headquarters, so that in the event of an emergency the fires can be turned off at this point.

All the gas available at the station from the Kettleman Hills field is routed through the atmospheric cooling tower, where it is cooled to approximately 55° F. The cooled gas then passes through liquid separators for removal of condensed water. The gas to be further dehydrated by the glycol plant is taken off in an 8-in. line downstream of the liquid separators, and the balance of the cooled gas is routed south in the main transmission system. An 8-in. connection was installed between the dehydration gas line downstream of the contact towers and the main transmission line downstream of the 8-in. takeoff to the contact towers so that any dehydrated gas in excess of that required to meet the San Joaquin valley demand may be returned to the main transmission system. By this arrangement the contact towers may be operated at maximum capacity regardless of load requirements.

From the standpoint of economy it was decided to operate the towers at their combined rated capacity of 25 MMcf per day. However, this rate is dependent upon operating conditions and gas available. The quantity of gas treated to date has averaged 21.6 MMcf for the two towers. The plant was placed in operation on Nov. 29, 1949. The station is manned on a 24-hour basis so it has been convenient to have an operator inspect the units at regular two-hour intervals. Operating data has been recorded every four hours. This is probably oftener than is necessary and these schedules are subject to change with experience.

Table 1 is a representative summary of data recorded during the past few months of operation. Figures shown are the averages of readings taken at regular intervals during this period.

The data in *Table 1* are an indication of the results being obtained, and on this basis it is possible to make the following observations with respect to performance of the plant during this original period of operation.

1. The average dew-point depression of 59°, which has been obtained, is more than ample to accomplish the required result and is in excess of the manufacturer's rating. This, no doubt, is due to the lower gas inlet temperature and the higher rate of glycol circulation. It is planned to make further tests at higher gas temperatures and lower glycol rates. The gas temperature may be raised by shutting down the cooling tower and the glycol rate lowered by bypassing a portion of the glycol through the fibre glass filters in the bypass lines around the glycol pumps.

2. Additional heat transfer between the rich and lean glycol and between the hot glycol and the earth was obtained by burying all the glycol lines in the same trench. The temperature of the hot glycol, on its way to the contact tower, is being lowered an average of 19°, from 194° to 175°F. The temperature of the cool glycol, returning to the regenerating units, is being increased an average of 9°, from 59° to 67°F. This, of course, was not considered by the manufacturer in rating the units and is, no doubt, partially responsible for the results being obtained.

3. The average glycol circulation rate of 136 gal. per hour is higher than specified. It was necessary to increase the pump speed to obtain better lubrication and there has been no need, so far, to bypass any of the glycol for filtering. The fluid meters furnished with the units were removed due to irregular operation and have not been replaced. Consequently, the rates of circulation established are only approximate, having been obtained by observing the rate of

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Tennessee Gas Transmission Company's New Worthington Uniflo TYPE UTC-16 Draws Visitors From Near And Far

So widespread was the interest in Worthington's new Angle Gas Engine Compressor, TYPE UTC-16, that engineers and other executives from transmission companies all over the country came to see the first of these units in actual service — at the Tennessee Gas Transmission Company's Monroe, La., plant.

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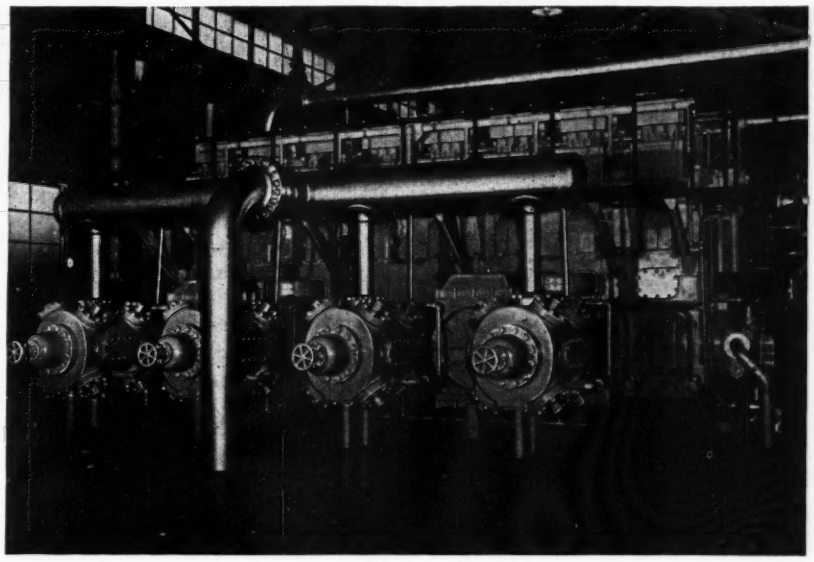

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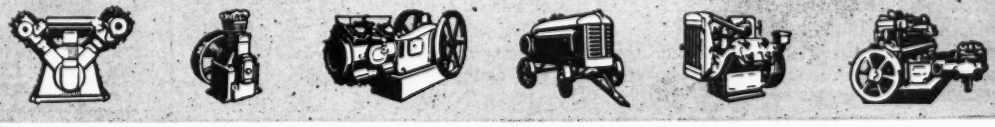


fluid level increase in the bottoms of the contact towers with the glycol outlet valves closed.

4. So far as it has been possible to determine, the glycol loss in the plant has been negligible. Laboratory analyses of the still condensate indicate a glycol concentration of less than .06%, which is the lowest measurable percentage. There has been no evidence of any carry-over in the dry gas line and the level of liquid in the storage tanks has remained fairly constant during the past two and a half months of normal operation. Prior to that time, a quantity of glycol was lost due to an overflow of the storage tanks on one occasion and a backflow of gas through the contact tower on another. These were unusual circumstances and the plant has not been charged with this amount as a normal operating loss.

5. The total fuel gas consumption of the reboiler burners has averaged 11 Mcf per day for the two units, or approximately 500 cu ft per MMcf of gas treated. On an assigned value of $0.25 per Mcf for fuel gas this amounts to approximately $2.75 per day or 13 cents per MMcf of gas treated. It is interesting to note that the average burner input per unit has been 252,000 Btu per hour as compared to the reboiler heat capacity rating of 500,000 Btu per hour.

6. Electricity used to operate the pump motors has averaged 66 kwh per day or 3 kwh per MMcf of gas treated. The cost of this item has been $1.10 per day or 5 cents per MMcf of gas treated.

7. Laboratory distillation of the rich and lean glycol samples, taken periodically, indicates an average water content of 1.75% in the glycol entering the towers and 3.05% in the glycol leaving the towers. These figures indicate that the water being removed from the gas has averaged 1.30% by volume of the glycol being circulated or 3.54 gal. per hour. This is equal to 3.90 gal. or 32.5 lb per MMcf of gas treated.

Using the average dew-point depression obtained and the water vapor content chart prepared by the University of Oklahoma Engineering Department in April 1949, the water removed may also be calculated by the following method.

The water vapor content of the saturated gas, entering the contactors at 55°F and 400 psia, is 32 lb per MMcf. The water vapor content of gas with a dew-point of —4°F at 400 psia, the condition under which it leaves the contactors, is 3.2 lb per MMcf. The water being removed from the gas, on this basis, would be 28.8 lb per MMcf, 3.45 gal. per MMcf, or 3.11 gal. per hour. These figures are in fair agreement with those above since, due to the relatively large volume of gas treated, any slight error in the determination of flow rates, dew-points, or glycol concentrations would be magnified in the final results.

According to the results of the laboratory tests, the average glycol concentration of the glycol stream discharged from the contactors is 96.95% and the glycol concentration of the glycol stream entering the contactors is 98.25%. This indicates very good glycol regeneration. In this respect it should be noted that, while the average reboiler temperature has been 353°F, temperatures of 375° or higher are permissible if necessary to gain the required efficiency.

No serious maintenance problems have been encountered in plant operations thus far. Numerous small glycol leaks have developed in the plant piping, especially in the hot lines and in threaded joints, but these are being gradually controlled. Some difficulty has been experienced in establishing circulation with the glycol pumps after a shut-down.

However, this has been practically eliminated by priming with water from an outside source. A hose connection and a check valve were installed in the suction lines to the pumps to facilitate this operation. It has been necessary to grind the pump valves once since installation, but this is considered normal maintenance. The liquid level control on the No. 2 tower has failed to operate on several occasions. This control is an inverted bucket type trap, and in each case it was found that a small particle of foreign material, possibly present in the tower at the time of installation, had plugged the vent hole in the top of the bucket. The installation of strainers in the glycol lines ahead of the traps is expected to eliminate this trouble. The reboiler pilot lights were extinguished once in a severe windstorm. This was discovered by the operator on his regular tour of inspection and plant operations were not affected. It is proposed to install safety shutoff controls in the burner fuel lines so that the gas supply will be discontinued automatically in the event that a pilot light goes out or electric power fails.

The plant has not been in service a sufficient length of time to permit an accurate estimate of operating costs to be made. According to the manufacturer, a glycol loss of 0.1 gal. per MMcf of gas treated should be expected. At rated capacity this would amount to 2.5 gal. per day or $5.23 per day, at the current price of triethylene glycol, and would be a major item of expense. Our experience, as previously explained, has not disclosed any substantial loss at present operating pressures and gas flow rates. We should probably assume, for the sake of estimation, that over a period of time some glycol make-up will, however, be necessary. A figure of 0.5 gal. per day should be sufficient to cover this loss. An approximate estimate of operating costs, excluding labor etc., may then be made as shown in *Table 2.*

Table 3 gives comparative figures in rating the performance of the plant.

The final proof of satisfactory performance should probably be gauged by the results obtained in correcting the moisture problems that existed in the transmission line and subsequent distribution facilities prior to the installation of the plant. Drips along the transmission line, from which an average of 71 gal. of liquid per month was previously removed, have been dry for the past three months. Reports from the distribution areas indicate a substantial reduction in "no-gas" orders. These orders have been reduced from an average of 19 per month, during the winter of 1947-48, to an average of five per month since the plant has been in service. Also, the free water that was previously blown from the lines has been practically eliminated. Further improvement is expected as the distribution lines are dried up.

In conclusion it can be said that apparently this plant is doing a very satisfactory job of meeting the requirements for which it was installed and the skid mounted glycol dehydration unit is worthy of consideration as a possible solution where similar dehydration problems exist. A dew point depression in excess of the manufacturer's rating has been obtained at approximately one-half the estimated operating cost. The original investment is substantially less than that required for other glycol type systems and installation is not complicated. A minimum of maintenance and operation attention has been required, and the fact that the units are available in various capacities is an added advantage.

TABLE 3. PERFORMANCE VS. RATING

		Mfr. Estimate	Actual Operation
Gas treated	(MMcf per day)	25.2	21.6
Dew point depression	(°F)	50	59
Gas fuel consumed	(Mcf per day)		11
	(Mcf per MMcf)		0.5
Glycol circulated	(Gal per hour)	160	272
Water removed	(Gal per MMcf)		3.68
Glycol loss	(Gal per MMcf)	0.1	Small
Operating cost	(Per day)	$10.00	$4.95
	(Per MMcf)	$ .40	$ .20

TABLE 2. ESTIMATE OF OPERATING COSTS

Fuel gas consumed	11 Mcf per day	$2.75
Electricity used	66 kwh per day	$1.10
Glycol loss (estimated)	0.5 gal per day	$1.10
	Total (per day)	$4.95

At rated capacity, 25 MMcf per day, the approximate cost of operation will be 20 cents per MMcf of gas treated. This corresponds to 6 cents per actual gallon of water removed from the gas.

Current Output of Galvo-Pak Magnesium Anodes

. . . as a function of anode size and soil resistivity

By T. H. Gilbert

THE develpment of magnesium as a galvanic anode for cathodic protection purposes has aroused considerable interest in the performance of magnesium anodes under actual service conditions. The primary interest is probably in the current output of magnesium anodes because an engineer must first be able to predict or know how much current is available before he can intelligently design a cathodic protection system. In this paper the current outputs of Galvo-Pak, type 1-B or 3-B, magnesium anode installations are presented as functions of anode shape and size and of soil resistivity. Galvo-Pak magnesium anodes are made and distributed by Dowell Inc. of Tulsa. Other magnesium anodes are available from other companies, but experiences to date on the Southern California Gas Co. lines have been limited to Galvo-Pak anodes.

The current delivered by any galvanic anode varies directly as the driving voltage and inversely as the total circuit resistance according to Ohm's law, $I = E/R$. The total resistance of a Galvo-Pak magnesium anode circuit is composed of the resistance of the metallic part of the circuit, the anode and cathode film resistances, and the anode and cathode resistances to ground. The anode resistance to ground is the sum of the package internal resistance and the package resistance to ground. When the cathode is a relatively long and bare or poorly coated pipeline the metallic resistance, cathode film resistance, and cathode resistance to ground are all negligible and can be eliminated from consideration. The total resistance can then be considered as being made up of two major components, namely the anode resistance to ground, which varies with soil resistivity, and anode film resistance.

The resistance of a vertical anode to ground[1] can be determined from the formula:

$$R_v = \frac{.0164\rho}{\pi L}\left(\ln \frac{96L}{d} - 1\right)$$

where R_v = resistance of a vertical anode to ground in ohms

ρ = soil resistivity in ohm-cm

L = length of buried anode in feet

d = diameter of the anode in inches

For a vertical anode the size of a Galvo-Pak magnesium anode, approximately 8 in. in diameter × 26 in. long, this formula reduces to:

$$R_v = 0.00545\rho$$

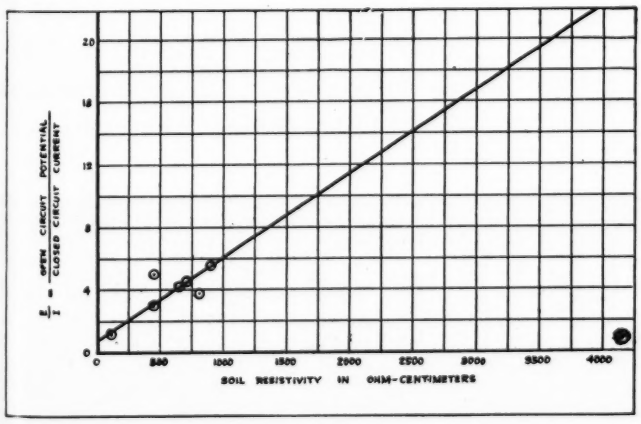
The anode film resistance is assumed to be constant, and when $\rho = 0$ it is the only major component of resistance in the circuit. It is most easily determined experimentally. A considerable number of Galvo-Pak magnesium anodes have been installed on some of the transmission and distribution mains in the Southern California Gas Co.'s natural gas system. Tests made at several of these installations are plotted in *Fig. 1* in the form of the ratio of the open circuit potential between pipe and anode to the closed circuit current flow, E/I, versus soil resistivity, ρ. Drawing the best straight line through the points, the anode film resistance is 0.8 at the intercept $\rho = 0$.

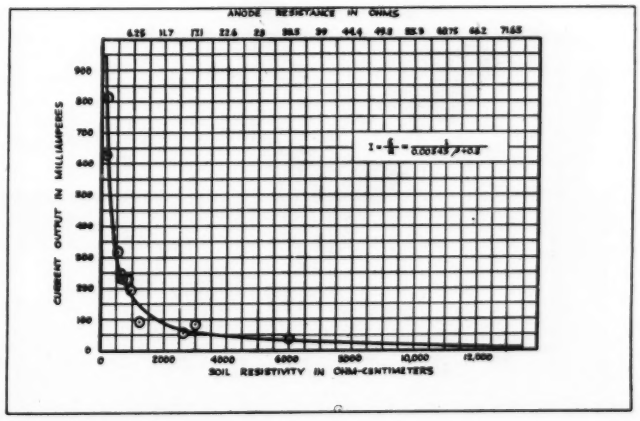
The total circuit resistance can now be written in terms of one variable, soil resistivity, where $R = 0.00545\rho + 0.8$. (Equation [A]). This total resistance can also be developed mathematically.[2] Following this procedure, the slope of *Fig. 1* is 0.0053 reciprocal centimeters and the intercept at $\rho = 0$ is again 0.8 ohm, and a second equation can be written where $R = 0.0053\rho + 0.8$. (Eq. [B]). Since both equations are in close agreement and if experimental data closely follows Equation [A], it can be said that the equation is correct within limits of experimental accuracy and practical usefulness.

As applied for cathodic protection,

Mr. Gilbert is research engineer, Southern California Gas Co., Los Angeles. His paper was originally presented at PCGA's technical services conference, San Diego, March 8 & 9.

Fig. 1 (below). Anode film resistance curve from field data. Fig. 2 (right). Current output of Galvo-Pak magnesium anodes vs. soil resistivity. Current output is for bare or poorly coated pipe; circled points are field test data.





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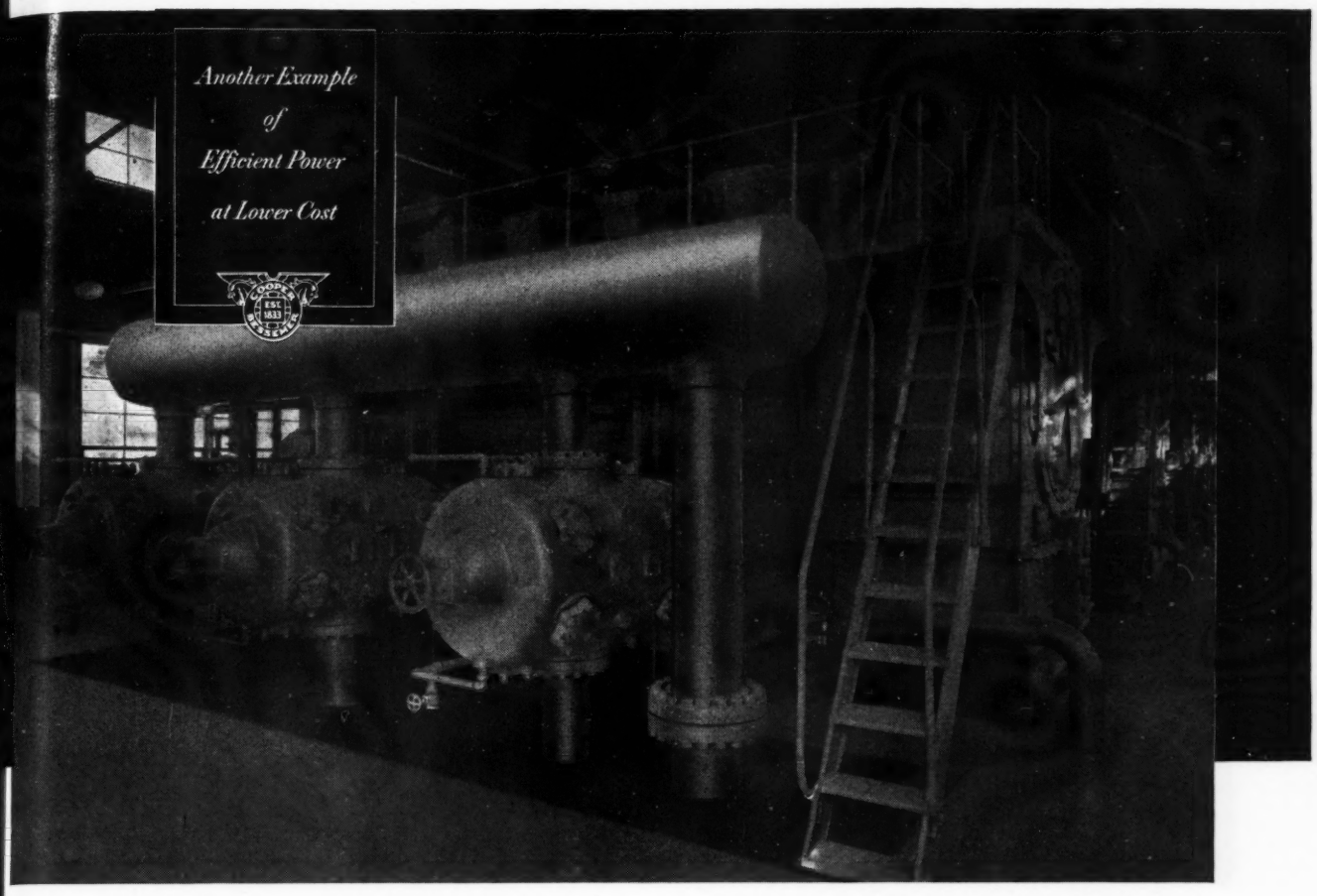
Compressors

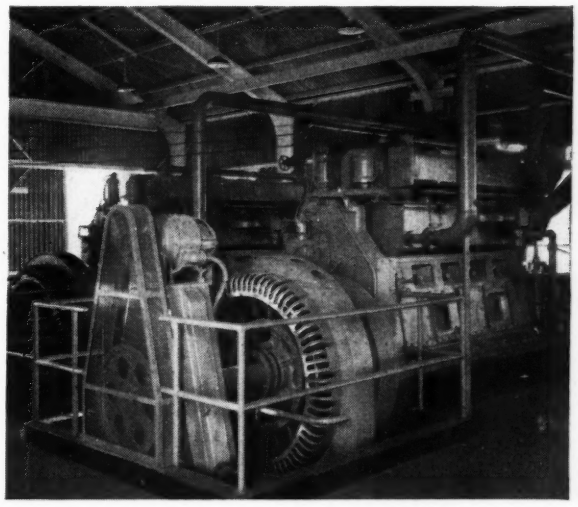
New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, W



These five big Cooper-Bessemer GMW Turboflow units being installed in Transcontinental's new Saint Francisville station are rated 2500 hp each. Unique, recently developed features of these modern units assure new low in over-all operating cost.

a full 15 per cent reduction in "normal" fuel consumption . . . *plus* at least 10 per cent greater horsepower! So it's not only a matter of saving fuel. The over-all cost of installation, foundation, piping, housing, operation and maintenance reaches a new low . . . continues to pay off year after year. You may want to verify their savings with Fish Engineering of Houston, Texas, who are doing the engineering and construction of this line.

Whatever your compressor needs may be, be sure to check into *all* the advantages of Cooper-Bessemer V-angle Turboflows, now available from 220 to 2500 bhp per unit.

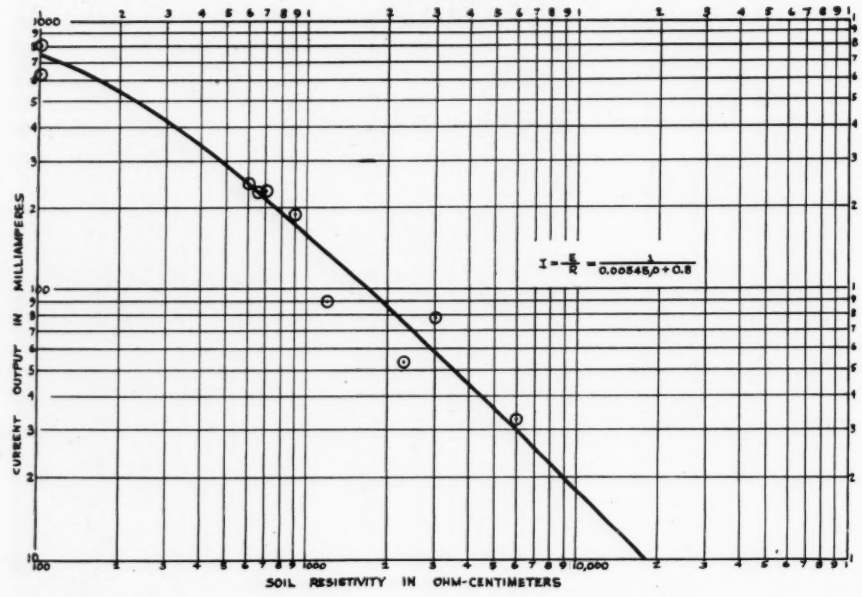


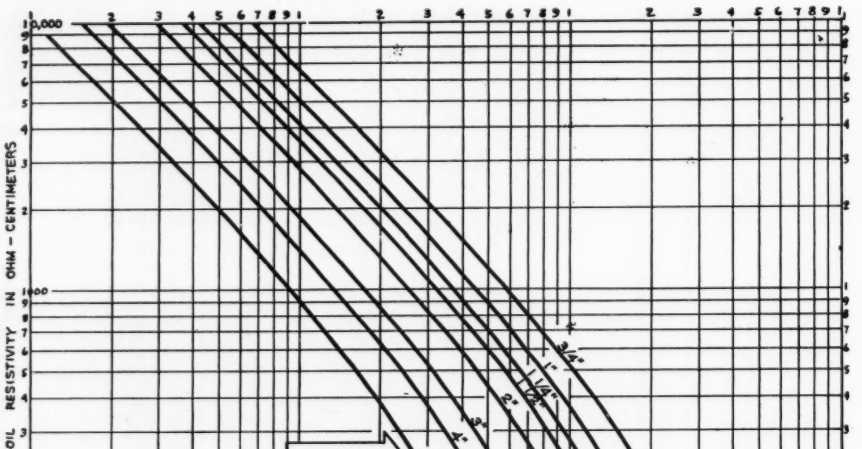
Also serving at St. Francisville are these two rugged, long-lived Cooper-Bessemer JS-5, 375 hp gas engines driving General Electric 250 kw generators for all electric power needs.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

..., Dallas, Greggton, Pampa and Odessa, Texas Tulsa Shreveport St. Louis Los Angeles





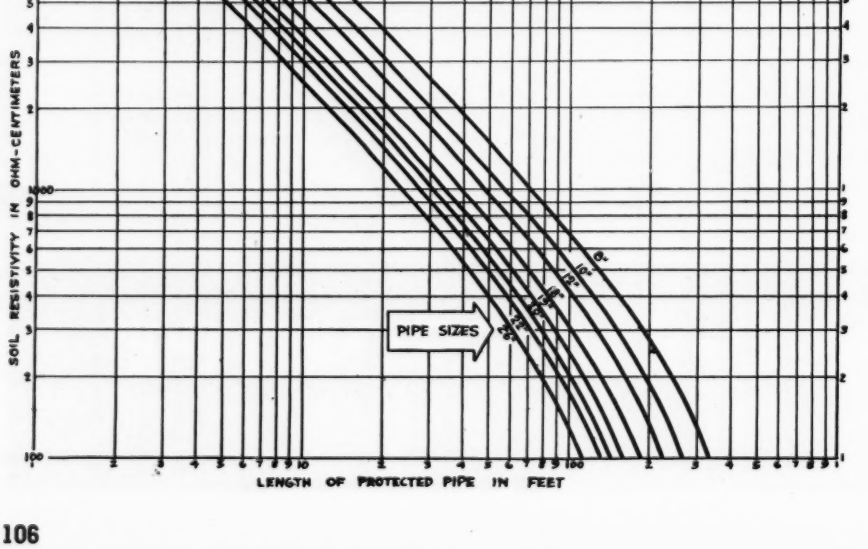


Fig. 3 (top). Current output of Galvo-Pak magnesium anodes vs. soil resistivity. (For bare or poorly coated pipe; circled points are for field test data.) Figs. 4, 5 (center and below). Length of bare or poorly coated pipe that can be protected by one anode vs. soil resistivity. (Curves are for pipe insulated from all substructures; type 1-B or 3-B Galvo-Pak magnesium anodes; current density assumed uniform at 1 ma./sq ft of pipe surface).

the open circuit voltage developed between magnesium and steel ranges from approximately 0.7 to 1.3 volts depending upon the soil, the metal, and its corrosion history. It has been found at widely scattered locations that the open circuit potential between anode and pipe averaged about 1.0 volt.

Using this value of 1.0 volt, the current output of a Galvo-Pak magnesium anode can be predicted approximately by application of Ohm's law as follows:

$$I = \frac{E}{R} = \frac{1}{0.00545\rho + 0.8}$$

where I = current output in amperes
ρ = soil resistivity in ohm-cm

Curves plotted from this formula are shown in *Figs. 2 and 3*. The plotted points are actual field measurements of current output and soil resistivity from widely scattered locations. Since the plotted points closely follow the calculated curve, and both compare favorably with observations made in other parts of the country,[3] it is concluded that the current output during the early life of a magnesium anode can be predicted with considerable accuracy if the soil resistivity is known.

Curves representing length and size of bare or poorly coated pipe that can be protected by one magnesium anode versus soil resistivity are plotted in *Figs. 4 and 5*. These curves are presented only as examples and are based on the assumption that a uniform current density of one milliampere per square foot of bare pipe will cathodically protect the metal. If a current density of more or less than one milliampere per square foot is required, the number of anodes required to protect a given length of pipe as determined from the curves should be multiplied by the desired current density.

REFERENCES

(1) *Corrosion Handbook*, Herbert H. Uhlig, page 938.
(2) "Current Output of Light Metal Galvanic Anodes As A Function of Soil Resistivity" by E. D. Verink, K. K. Reid, and E. R. Diggins. *Cathodic Protection, A Symposium*, pages 101-103.
(3) "Mitigation of Corrosion of Bare Pipe Lines by Application of Magnesium Anodes" by Robert L. Bullock. *The Oil and Gas Journal*, Oct. 6, 1949.

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why Fluor can give you

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New Pipeline Company Plans 2175-Mile Line From Texas to Vancouver

TRANSCONTINENTAL Gas Pipe Line Corp., with your 1840-mile Texas-to-New York line — take a back seat, please.

Soon you may have only the *second* longest pipeline in the world.

For down in Texas, where they do things on a big scale, they're cooking up a scheme to pipe gas through a 26-in. tube all the way to the state of Washington and on into Canada. That calls for 2175 miles of mainline pipe and an estimated outlay of $174 million for labor and materials.

Gas utilities in the fast-growing Northwest, who have been eyeing the Canadian province of Alberta as the logical source of natural gas, may now turn their attention —and hopes—to the fertile gas pools of the Southwest. This is no idle dream; in fact, at first blush, it would appear that the unlikely sounding Texas-to-Vancouver project is more likely to succeed than the several plans for importing the gas from Alberta.

While the latter proposals are now more than two years old, they still must clear what has been up to now a reluctant Canadian government. Hearings are due to resume soon, but even should the powers give speedy blessing, the chosen one would still have another hurdle to clear—the FPC. The Texas firm, on the other hand, has already made its formal bid to the commission.

The new company, doing business from Houston, is named Pacific Northwest Pipeline Corp., and lists as its president Robert R. Herring. Ray C. Fish, president of Fish Engineering Corp., Houston, is a director, and his firm has contracted to handle engineering, construction, and management of the job.

There is, of course, one provision in the scheme on which the company may stub its toes—the provision that a lateral be built from a connection with the main line near Hanford, Wash., to run northeastward through Spokane and into Idaho, crossing there into Canada to tap the Pincher creek field in Alberta. One hundred million cubic feet would be brought from this source daily to augment the 250 MMcf initial input at the Texas end. But the nature of the project —the fact, for example, that most of the gas will come from Texas and that practically all of the Canadian gas would be piped back into the country at Vancouver—may overcome the northern neighbor's caution.

Facilities in addition to the mainline include 400 miles of laterals for gathering and distribution and aggregate horsepower of 83,200, divided among 13 stations of 6400 hp each.

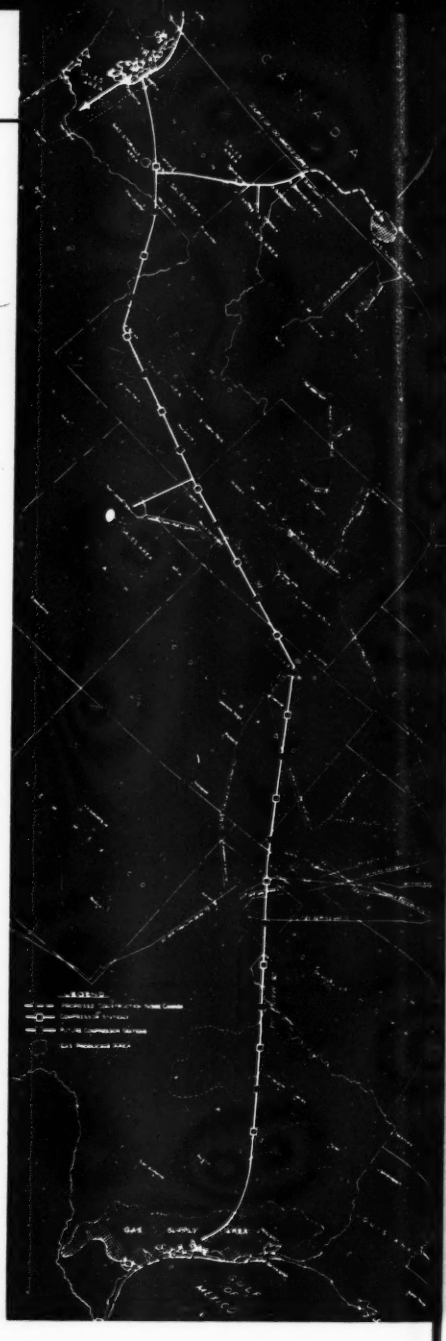
As the map shows, Pacific Northwest would serve some important areas en route, including Salt Lake City; Boise, Pocatello, Twin Falls, and Idaho Falls, Idaho; Portland, Ore.; and, from the lateral running into Canada, Spokane and Hanford, Wash. (including the atomic energy plant); the Kellogg and Wallace area, Sand Point, Eastport, Bonners Ferry, the atomic energy plant, and the Arco area, Idaho; and Vancouver, B. C.

Speedy approval of the line would enable Pacific Northwest to begin delivering gas by early 1952, according to company spokesmen.

In its application, Pacific Northwest is laying heavy stress on the national defense potentialities of the line. By so planning the project to bring in these factors, the company has placed its system in the unique position of being able, through a Texas-to-Vancouver line, to bring Canadian gas to Canadians, to pipe gas—if need be—from Texas to Alberta itself—if that province's present position should be reversed; or even of serving Chicago and Detroit. This latter proposition is made possible by the fact that the line would intersect presently operating carriers of Cities Service Gas Co., Oklahoma City; Natural Gas Pipeline Co. of America; Northern Natural Gas Co., Panhandle Eastern Pipe Line Co., Michigan-Wisconsin Pipe Line Co., and Colorado Interstate Gas Co. Thus, should the need arise, additional gas could be channeled from the Gulf Coast fields to vital areas in the Midwest.

This feature would bring to reality, in part, the prophecy of El Paso Natural Gas Co.'s president, Paul Kayser, who three years ago foresaw the linking of the nation's pipelines in a gigantic, flexible network, with reversal of flow possible when required.

Flare gas would be the chief source of supply, according to the company, although secondary sources would be afforded by the many lesser or non-producing fields which would be traversed by the line in its route across Texas and through Colorado, Wyoming, and Utah.



BIGGEST PIPELINE yet proposed is mapped above. Line would carry gas from Texas fields to serve markets in the northwestern U. S. and Vancouver, B. C. Note proposed augmentation of gas supplies for the area through extension to Canada's Pincher Creek fields.

Company officials state that the managements of both atomic energy installations are "in serious need of natural gas." The non-governmental markets to be served are equally gas-hungry. With an estimated population increase of 30% in 10 years, the Pacific Northwest has developed many heavy industries requiring gas for fuel.

Pacific Northwest would assure a high load factor with one, and possibly two, storage fields. Near Hanford, Wash., is a depleted field, potentialities of which are established. Another field near Everett, Wash., is being investigated.

PIPELINE NEWS

Valley Gas Submits to FPC Plan for 1000-Mile Line

Valley Gas Pipe Line Co. Inc., a new Houston corporation, has asked the FPC to okay a $144,500,000, 1000-mile, 30-in. pipeline project to carry natural gas from the Gulf Coast and offshore fields in Louisiana and Texas to Indiana, Ohio, and Michigan. Initial daily delivery capacity of 330 MMcf is planned, and the firm said it may seek authorization for an increase to 505 MMcf.

In addition, the company would build 500 miles of 24-in. line in Louisiana and Texas, together with necessary laterals for supply and distribution. A 13,250-hp compressor station would be located at Saratoga, Texas, and a 13,250 - hp station would be built at Poplar Bluff, Mo. Additional stations with a total of 70,000 hp would be added as needed.

Reserves arrangements assuring 330 MMcf per day for 20 years have been completed, the application stated, and financing negotiations are still under way.

The ultimate delivery capacity would be split among cities in Indiana, Ohio, and Michigan, those in the former two states to receive a combined total of 150 MMcf, with Michigan cities getting 355. FPC gave no specific information as to which cities would benefit.

Heading the newly formed company is Curtis B. Dall of San Antonio, former son-in-law of President Roosevelt.

Texas Gas Files Three Plans for Expansion

Texas Gas Transmission Corp., Owensboro, Ky., was keeping the Federal Power Commission busy last month, filing three applications and receiving one construction certificate.

Examiner Emery Woodall rendered an initial decision, subject to review, authorizing Texas Gas and Mayfield (Ky.) Gas Co. to build facilities to make available a maximum of 1 MMcf per day to the Kentucky utility. Facilities involved are a meter station and 2 miles of 6-in. line.

The cost of the facilities—a total of $52,000—belies the importance of the case. Taking as a precedent the Supreme Court decision bringing East Ohio Gas Co.'s intra-state system under FPC jurisdiction, Woodall decided Mayfield is a natural gas company subject to commission surveillance, since the gas in question comes originally from Texas.

Five other sales meter stations were requested in another docket by Texas Gas, these for the purpose of making gas available to several small communities in Arkansas and Kentucky.

The plan to lay two 20-in. lines under the Mississippi river, previously announced (*GAS*, July, p. 92) was also laid in FPC's lap. Construction would begin by September. The lines are needed, says Texas Gas, because of the failure last spring of four of its submarine crossings which has caused a serious pressure drop and resulting capacity decrease.

Simultaneously, Texas Gas sought approval of the installation of 9960 hp in compressor capacity in present and proposed stations to boost deliveries to Texas Eastern Transmission Corp. To cost $2.1 million and include one new 4500-hp station in Kentucky, the facilities would increase deliveries by 60 MMcf from Nov. 1, 1950, to Nov. 1, 1951, and 34 MMcf during the following 12 months pending completion of Texas Eastern's application to supply Algonquin Gas Transmission Co. for resale in New England.

Four Carolina Service Plans Consolidated in FPC Hearing

The four applications to serve natural gas to North and South Carolina were lumped together last month by FPC, and hearings in the consolidated case opened July 12.

First was Transcontinental Gas Pipe Line Corp., Houston, which wants to install additional horsepower in already authorized compressor stations on its Texas-to-New York line in order to make gas available to two other applicants. These latter include Piedmont Natural Gas Co. Inc., Spartanburg, S. C., which filed a new plan to serve certain North and South Carolina cities after the FPC had thrown out its predecessor company's scheme to serve these areas and Virginia as well; and Public Service Co. of North Carolina Inc., Gastonia, which would bring gas to 39 cities in the territory.

Fourth company is Carolina Natural Gas Corp. of Charlotte, N. C., which also wants Transcon gas for resale. Concurrent with its order coordinating the hearings, FPC severed the connection between Carolina Natural's application and Transcon's docket to carry natural gas to New England.

New York State Files For Lines to Serve East Ohio

A proposal to construct connecting pipelines in Pennsylvania and Ohio has been submitted to FPC by New York State Natural Gas Corp., New York, and The East Ohio Gas Co., Cleveland. The project, which would cost $3,792,806 for New York State and $40,950 for East Ohio, would bring more gas to East Ohio during the winter.

New York State plans to build a 20-in. line from Westmoreland county, Pa., to a point on the Pennsylvania-Ohio state line where it would connect with a 1-mile, 20-in. line to be built by East Ohio. Peak day deliveries to East Ohio may reach 87 MMcf, the New York company stated, and a steady 40 MMcf per day during January, February, and March will be available. Aggregate winter delivery per year will be about 3600 MMcf, New York State Natural said.

The discovery early this year of the Leidy gas pool in Clinton county, Pa., enables New York State to supply additional quantities to East Ohio.

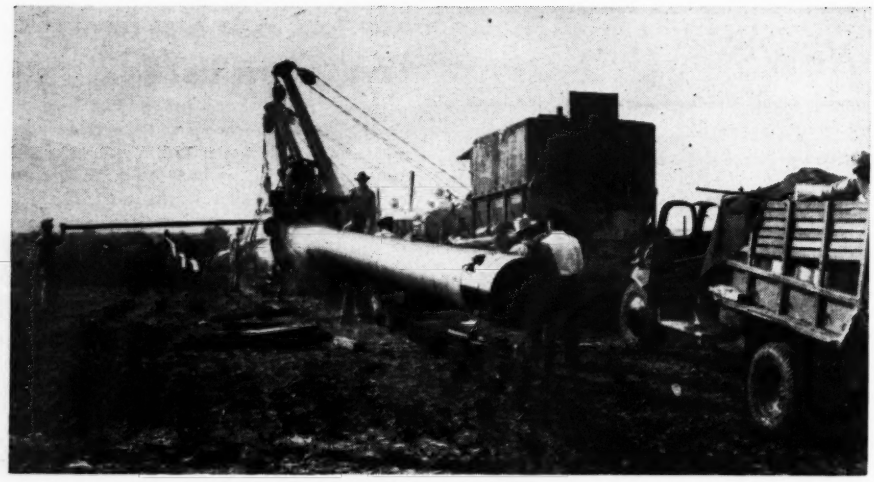
Meanwhile, FPC ordered hearing to commence July 17 on the joint application of New York State Natural and Texas Eastern Transmission Corp. to build and operate underground storage facilities in Pennsylvania (see July *GAS*, p. 100.)

FPC Passes Ohio Storage Plan

Facilities including two 8⅝-in. lines totaling 12.3 miles, a 940-hp compressor station, and an underground gas storage pool in Columbiana county, Ohio, will be built by The East Ohio Gas Co., Cleveland, to help meet increasing demands for gas. FPC recently okayed the $622,700 project.

East Ohio will operate the pipelines solely to store gas in the underground pool during off-peak periods and to ship it back into its system when it is needed. Ultimate capacity of the storage facilities is estimated at 2400 MMcf with daily delivery of 33 MMcf.

P. D. Merrill, vice president, directs ground breaking as M. B. Skinner Co. begins construction of an addition at its South Bend, Ind., plant to enlarge production space 50%.



PRIMING AND WRAPPING machine resumes work on 20-in. Lone Star Gas Co. line from Opelika, Texas, to Dallas-Fort Worth area after completion of one of many highway crossings. Line will be laid beneath highway at this point by returning crew. Such crossings usually are laid in advance of the long welding, wrapping, and lowering-in job.

Michigan-Wisconsin To Double Capacity of Mainline

On June 29 the FPC granted temporary authorization for the construction of facilities which will nearly double sales capacity of Michigan-Wisconsin Pipe Line Co.'s Texas-to-Michigan line. The authorization, however, carried the stipulation that the facilities shall not be operated until the commission issues another order to that effect.

Michigan-Wisconsin will install 139,200 hp additional compressor capacity at a cost of $22,732,200, and Michigan Consolidated Gas Co., Detroit, will build facilities to provide additional storage capacity required in connection with the expansion plans. Estimated cost of Michigan Consolidated's portion is $15,346,500. The program will increase annual capacity of the line from 56,575 MMcf to 110,595 MMcf.

Order Panhandle-Indianapolis Tie

Panhandle Eastern Pipe Line Co., Kansas City, Mo., which is increasing its system capacity from 500 MMcf to 800 MMcf in two steps, has been ordered by FPC to connect its facilities with those of the city of Indianapolis in order to deliver 10 MMcf per day to Citizens Gas & Coke Utility there.

The commission's move backed up an initial decision by Examiner Edward Marsh, rendered last October, and an FPC order of May 4, 1950, authorizing the Panhandle expansion program.

If Indianapolis is ready to receive the gas by Oct. 1, 1950, Panhandle must be ready to provide it.

Cincinnati Deliveries to Rise

In a move to enable Central Kentucky Natural Gas Co., Charleston, W. Va., to meet its anticipated peak requirement of 251.5 MMcf daily next winter, FPC has okayed the company's plan to build a 41-mile, 20-in. loop and add an 880-hp compressor to its station at North Means, Ky.

The program, which will cost $2.7 million and will increase the system capacity from 191.5 MMcf per day, will permit the company to increase its deliveries to the Cincinnati market area. The line will run from North Means to Foster, Ky.

Tennessee Gas Transmission Co. will supply the added gas for Central Kentucky.

Compressor Barges Being Built

Three submersible compressor barges for use in the transportation of gas from wells in submerged areas are being built for Gulf Oil Corp. by the Bethlehem shipyards at Beaumont, Texas, the Dallas *Times Herald* reported recently. This is the first attempt to use mobile barges of this size as a link between wells and pipelines.

The barges—128 ft long, 36 ft wide, and 10 ft deep—will each carry four compressors capable of handling a total of 15 MMcf of field gas daily. The barges can be taken to a well site, submerged, floated while the gas is pumped into them, and floated to another well site or to a pipeline terminal.

Pipeline Newsnotes

The largest capacity engine superchargers ever to be produced in the hemisphere, designed chiefly for use with Cooper-Bessemer type LS and LSV engines, are now being built in that company's Mount Vernon, Ohio, plant. The units will handle the requirements of any gas or diesel engine from 1200 to 2500 hp, according to Vice President Ralph Boyer.

Completion of the construction of an 11-mile natural gas line from Little Rock was celebrated June 30 in ceremonies held in Jacksonville, Ark., a fast growing industrial community 15 miles east of North Little Rock. Gov. Sidney McMath was chief among dignitaries participating.

Resumption of hearings was set for July 31 by FPC in the combined dockets of three companies proposing natural gas service for northeastern Ohio. The cases, involving applications of Lake Shore Pipe Line Co. and Grand River Gas Transmission Co., both of Cleveland, and Erie Gas Service Corp., Oil City, Pa., were recessed May 31 to July 10, then postponed. All three want to take 17 MMcf per day from Tennessee Gas Transmission Co. near Meadville, Pa., for transport to the same area east of Cleveland.

The $12 million plant Tennessee Gas Transmission Co. is building near Greensburg, Ky., to extract and recover liquid hydrocarbons from natural gas is now under construction. Initially the plant will strip about 400,000 gal. per day from 600 MMcf of gas to be passed through it, selling the by-products to the newly formed Mathieson Chemical Corp.'s $27 million chemical plant near Brandenburg, Ky. An 8-in. products line will be built next year in time to receive the hydrocarbons upon completion of the stripping plant next summer.

Facilities which would increase its daily natural gas supply by 100 MMcf have been applied for by United Gas Pipe Line Co., Shreveport. The firm has asked FPC approval for a 16-mile, 16-in. line in Louisiana, a 4000-hp compressor station, and a dehydration plant to be installed on the new line.

Radio facilities to provide communication with mobile units along the route of a natural gas pipeline now under construction in Montana and Wyoming have been requested by Montana-Dakota Utilities Co., Minneapolis. Estimated to cost $82,478, the equipment would include 14 stations along the line and 12 mobile stations in cars and trucks. Montana-Wyoming Pipe Line Co., also of Minneapolis, is building the line from the Worland gas field in Wyoming to a point north of Baker, Mont., and will lease it to Montana-Dakota. The radio facilities also would be owned by Montana-Wyoming and leased to Montana-Dakota.

Union Gas Co. of Canada Ltd. is importing natural gas from the U. S. at the rate of 400 MMcf a month, Pres. David P. Rogers told shareholders at the recent annual meeting. The gas is being received under a 1944 contract with Panhandle Eastern Pipe Line Co. Conditions of the U. S. export permit, however, prevent Panhandle from delivering full contract quantities of 5.5 billion cu ft annually.

Cities Service Gas Co., Oklahoma City, has asked for FPC approval of a plan to add three 1000-hp compressor units at an existing station in Anderson county, Kansas, and to construct a new 660-hp station in Johnson county to step up the amount of gas which may be withdrawn from Kansas storage fields. The $885,000 project would up daily withdrawals from the storage fields by 35 MMcf, according to the company.

Tennessee Gas Transmission Co., Houston, has received an FPC okay to construct and operate a sales meter station about two miles from Morehead, Ky., for the sale of natural gas to the city on an interruptible basis. Estimated cost is $3000. The city is presently partially supplied by L. C. Young, who operates a small natural gas system in the area. Initially, Tennessee will not sell the city more than 500 Mcf per day, although the FPC says service should be on a firm basis, and TGT must submit to the commission within three months a progress report on arrangements to make the supply firm.

Pennsylvania-Ohio line to connect with East Ohio Gas Co., Cleveland.

NORTHEASTERN GAS TRANSMISSION CO., pipeline to Massachusetts, Connecticut, Rhode Island, Maine, Vermont, and New Hampshire. In all, 501 miles of 3- to 20-in. line, in loops and laterals, in New England.

NORTHWEST NATURAL GAS CO., for 700 miles in Washington, Idaho, Oregon.

OHIO FUEL GAS CO., Columbus, 22 miles of 16-in. near Dayton, remove 330-hp Vandalia compressor station.

PACIFIC NORTHWEST PIPELINE CORP., 2175 miles of 26-in. from southern Texas to Seattle, Wash., Vancouver, B.C., via Oklahoma, Kansas, Colorado, Wyoming, Idaho, Oregon, Washington.

PANHANDLE EASTERN PIPE LINE CO., Kansas City, Mo., for 185 miles and 16,000 hp in compressor stations.

PEOPLES NATURAL GAS CO., Pittsburgh, 16 miles of 8- and 10-in., from Tennessee Gas spur in Big Beaver to borough of Midland, Beaver county, Pa. Start July, complete August.

PIEDMONT NATURAL GAS CO. INC., Spartanburg, S. C., six laterals totaling 74 miles, from Transcontinental main line to North and South Carolina cities.

PRINCE GEORGE'S GAS CORP., Chillum, Md., 20 miles of 22-in., Chillum to Rockville, Md.

PUBLIC SERVICE CO. OF COLORADO, pipeline from the Piceance Creek field in western Colorado to Grand Junction and Rifle.

PUBLIC SERVICE CO. OF NORTH CAROLINA INC., Gastonia, 365 miles connecting at 10 points with Transcontinental main line in North and South Carolina.

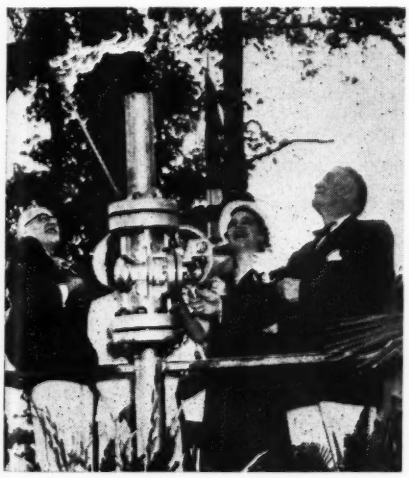
SOUTH CENTRAL ALABAMA NATURAL GAS CO. INC., 150-mile pipeline from a connection with Southern Natural's line in Elmore county.

SOUTHEASTERN MICHIGAN GAS CO., Chicago, 55 miles of 12-in. from connection with Panhandle Eastern main line in Oakland county, Mich., to Marysville, Mich.

SOUTH GEORGIA GAS CO., Atlanta, for 248 miles: Talbot county to Brooks county, 144 miles, plus 104 miles of laterals.

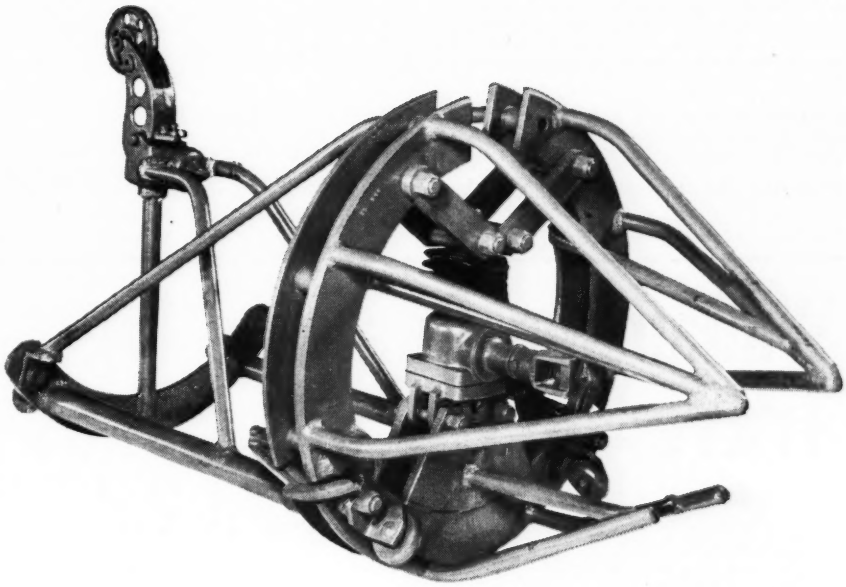
SOUTH JERSEY GAS CO., Atlantic City, 77 miles, Camden to Atlantic City.

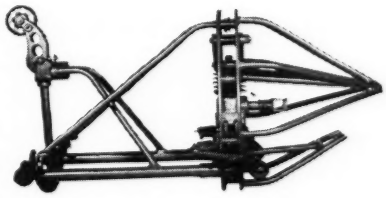
SOUTHERN UNION GAS CO., Dallas, for 15 miles of 10-in. and 12-in. from Kutz canyon to Blanco gas field, N. Mex.



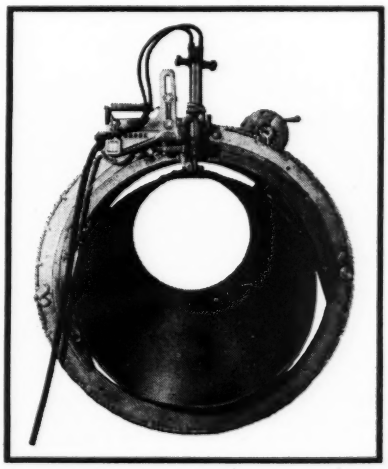
CLIMAX OF THE June 17 ceremony hailing the arrival of natural gas in east Tennessee was when Mrs. Alben W. Barkley touched off the blue flame. Col. Wade V. Thompson, president of East Tennessee Natural Gas Co., is shown at her left, and Vice President Barkley at her right.

CROSE CLAMP
INTERNAL LINEUP





CROSE INTERNAL LINEUP CLAMPS are available in manual, electric and hydraulic models for pipe sizes ranging from 12″ to 36″. Crose Internal Lineup Clamps have been proven in world-wide field operations.



CROSE PIPE CUTTING AND BEVELING MACHINE for fast true cutting and beveling of pipe. Available in six sizes for 4″ to 36″ pipe. All machines are built of high strength, light weight aluminum alloys. The continuous ring which goes around the pipe is hinged so that these machines may be installed as easily from the side of the pipe as from the end. Machines for 16″ pipe and above have "Out-of-Round" attachment as standard equipment.

M. J. CROSE
MANUFACTURING COMPANY, INC.
2715 Dawson Road TULSA, OKLA. Phone 6-2173

TENNESSEE NATURAL GAS LINES INC., Nashville, 24 miles of line near Nashville.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky., two 20-in. lines under Mississippi river near Greenville, Miss.; 9960-hp in existing and new compressors in Tennessee and Kentucky, to serve Texas Eastern.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, to boost capacity to 476 MMcf, 791 miles 30-in. from Kosciusko, Miss., to Connellsville, Pa.; seven compressor stations with 46,400 hp on new line, six with 52,500 hp on existing line; short lines in New York area; 35 miles of 30-in. from Fayette county, Pa., to Westmoreland county, Pa.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston, 11-mile mainline extension, 20- to 26-in. pipe, East Carteret, N. J., to Brooklyn.

UNITED FUEL GAS CO., Charleston, W. Va., 5.5 miles, 6450-hp compressor stations to deliver gas to storage pools in West Virginia.

UNITED GAS PIPE LINE CO., Shreveport, 16 miles of 16-in. from Koran gasoline plant site, La., to its Carthage-Sterlington line in Louisiana; 4000-hp compressor, dehydration plant.

VALLEY GAS PIPE LINE CO. INC., Houston, $144.5 million, 1000 miles of 30-in., from Hardin county, Texas, to southern Michigan, plus 500 miles of 24-in. in Texas and Louisiana, plus laterals, two 13-500-hp compressor stations, plus others aggregating 70,000 hp. Wants to start by Dec. 31, complete April 1, 1952.

Approved

CENTRAL KENTUCKY NATURAL GAS CO., Charleston, W. Va., for 32 miles, 20-in. loop from North Means, Ky., to Nicholas county, Ky.; one compressor in North Means station. To serve Cincinnati.

EAST OHIO GAS CO., Cleveland, two 8-in. lines totaling 12 miles, a 940-hp compressor station, and underground facilities.

MICHIGAN-WISCONSIN PIPE LINE CO., Detroit, 139,200 hp additional on mainline.

Bids Open

SOUTHERN UNION GAS CO., Dallas, 5.7 miles of 8-in. loop on Roswell (N. Mex.) main line. To start work in August.

Contracts Let

CITY OF FLORENCE, Ala., 82-mile system, to Modern Welding Co. Inc., Owensboro, Ky.

MARINE GATHERING CO., Houston, 10 miles of 8-in. from Rollover field in Gulf of Mexico to Submarine Pipeline Construction Co., Houston.

MICHIGAN GAS STORAGE CO., Detroit, 84 miles of 22-in., to start Aug. 15.

NORTHERN NATURAL GAS CO., Omaha. Missouri river crossing in Cass county, Neb., to Missouri Valley Dredging Co.; 16.5 miles of 16-in. lines in Kansas, to R. H. Fulton; 4-to-12-in. lines in Kansas to Reese Bros.

SOUTHERN UNION GAS CO., Dallas, 10 miles of 14-in. parallel line on Albuquerque main line, to Stafford Construction Co.

TEXAS-ILLINOIS NATURAL GAS PIPELINE CO., Chicago, on its 1331-mile line, to Midwestern Constructors, Inc., 100 miles of 26-in. from LaGloria, Texas, to Refugio, Texas—work to start Sept. 1; 100 miles of 30-in. from Mississippi river to Effingham, Ill.—work to start Sept. 15; 117 miles of 30-in. from Effingham to Sibley, Ill., and 92 miles from Sibley to Joliet, Ill.—both to start in 1951; Illinois river crossing near Morris.

TRUNKLINE GAS SUPPLY CO., Chicago, for 740 miles from Louisiana to Illinois. To R. H. Fulton, Lubbock, Texas, 278 miles of 12- and 20-in., and 184 miles of 26-in. To Mahoney Contracting Co., 186 miles of 26-in., to start Aug. 1.

UNITED GAS PIPE LINE CO., Shreveport, to Shanks & Eustace Inc., 18 miles of lay and takeup.

Under Way

ALABAMA-TENNESSEE NATURAL GAS CO., 70-mile line from Muscle Shoals, Ala., to Decatur and Huntsville.

ARKANSAS-LOUISIANA GAS CO., Shreveport. About 91 miles — Magnolia, Ark., to Malvern, Ark. — completed on the 163-mile, 20-in. Waskom, Texas, to Malvern line. Anderson Brothers Construction Co., Houston.

CENTRAL HUDSON GAS & ELECTRIC CORP., Poughkeepsie, 40 miles from Tuxedo to Poughkeepsie. Hudson river crossing started July 5.

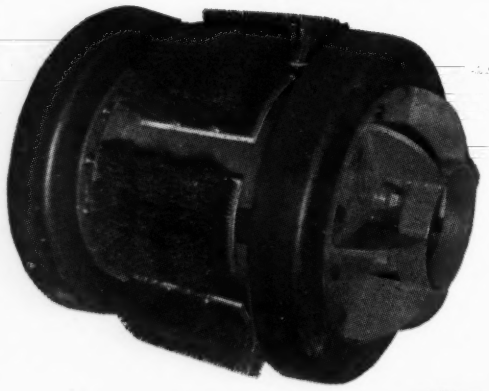
COMMONWEALTH NATURAL GAS CORP., Richmond, Va., 104 miles of 18-in., 84 miles of 12-in., 20 miles of 8-in., 20 miles to laterals. Ray L. Smith & Son Inc., El Dorado, Kan., started in July.

CONSOLIDATED EDISON OF NEW YORK INC., BROOKLYN UNION GAS CO., KINGS COUNTY LIGHTING CO. are building lines to receive gas from Transcontinental's Texas - New York line. ConEd will build 23 miles, Brooklyn will construct 12 miles, and Kings County will build 2.9 miles.

EAST TENNESSEE NATURAL GAS CO. is building 400 miles of 16-in. and 12¾-in. line from Lobelville, Tenn. to Oak Ridge. The job, including miscellaneous laterals, will be completed Oct. 1.

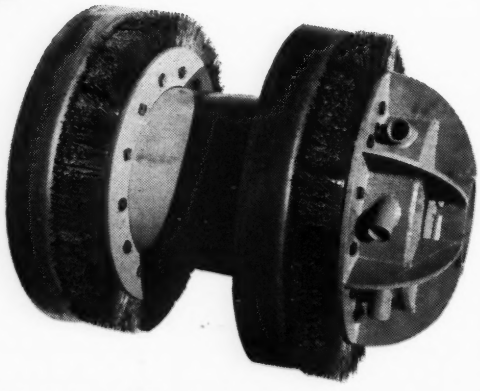
LACLEDE GAS CO., St. Louis, started May 31, 22- to 30-in. line, in city and county. Frazier-Davis Construction Co., contractors. To complete by November.

Williamson Gas Line Pigs* Traverse 1½R 90° Bends



← 24" Size New Design TYPE GP PIGS with Brushes Mounted on Arched Springs to Compensate for Wear

30" Size → Standard Design TYPE RCN-50 with Jet Rotation Feature to Distribute Wear



*Patents Pending

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Model 365, instead of 315, and Model 600, instead of "old standard" 500 ft., give comparable increases in production. All units are simple, rugged, portable over any ground where trucks can travel. Tractor-mounted models are available for roughest terrain.

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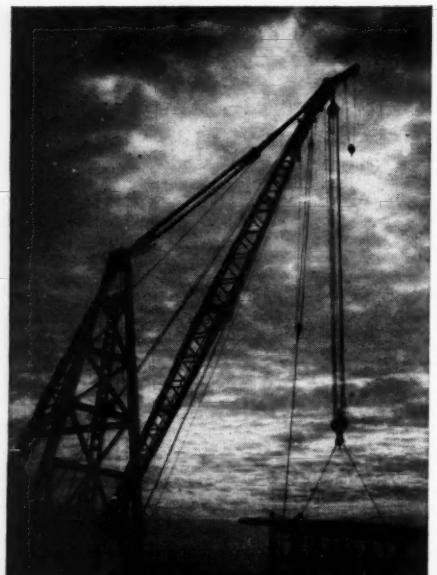

20" Line across the Mississippi River . . . by LATEX in 1949.

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Palo Alto California

MONTANA-DAKOTA UTILITIES CO., a 340-mile line from Worland, Wyo. to Cabin Creek, Mont.; includes a compressor and dehydration plant at Worland. Conyes Construction Corp.

MONTANA POWER CO., Butte, 80 miles 12-in., Bozeman to Butte. Parkhill Truck Co. stringing for C. N. Deaton.

NATIONAL UTILITIES CO. OF MICHIGAN, Grand Haven, river crossing at St. Joseph, Mahoney Contracting Co.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh, 26 miles of 16-in., Washington county to Westmoreland county, Pa. Williams-Austin Co. to complete this month.

NIAGARA MOHAWK POWER CORP., Syracuse, N. Y., to complete Aug. 1 19 miles 10¾-in. from Liverpool to Fulton, N. Y. Work on 16-mile 14-in. line near Syracuse to be completed Sept. 1. William Austin Co., Pittsburgh, United Engineers and Constructors Inc., Philadelphia, contractors.

NORTHERN NATURAL GAS CO., Omaha, under way on 597 miles of mainline loops. Beaver river (Okla.) crossing, R. H. Fulton; Smoky Hill and Solomon rivers (Kan.), two Iowa river (Iowa), Cannon river (Minn.), crossings, Trojan Construction Co.; two Nishnabotna, two Raccoon river (Iowa) crossings, R. B. Potashnick, under way. 155 miles of 20-in. in Kansas, Fulton, not started; 222 miles of 26-in. in Oklahoma and Kansas, Fulton, under way; Midwestern Constructors Inc. nearing completion on 43.4 miles of 26-in. between Palmyra, Neb., and Oakland, Iowa, to start on 66 miles of 26-in. north from Oakland; Potashnick starting on 111 miles of 26-in. near Ogden and Ventura, Iowa. Knupp Construction Co. Inc. under way on two of six laterals in Iowa totaling 42 miles.

PACIFIC GAS & ELECTRIC CO., San Francisco. Bechtel-Price-Conyes under way on 506 miles 34-in., Topock, Ariz., to Milpitas, Calif.

PANHANDLE EASTERN PIPE LINE CO., 137 miles of loop lines. Midwestern Constructors Inc. about complete on 69 miles of 26-in. loops in Kansas.

PLAINS NATURAL GAS CO., San Antonio, almost complete on 120-mile, 24-in. gathering system near Hooker, Okla. Midwestern Constructors, Tulsa.

PHILLIPS PETROLEUM CO., Bartlesville, Okla., 118 miles of gathering lines in Sherman and Hansford counties, Texas. Vaughn & Taylor.

ROANOKE PIPE LINE CO. is building a 30-mile, 8-in. natural gas line from Virginia Gas Transmission Corp.s line near Gala, Va. to Roanoke. Lehman, Hoge & Scott started in June, to complete about Aug. 1.

SOUTHERN CALIFORNIA GAS CO.—SOUTHERN COUNTIES, Los Angeles, 82 miles 30-in. between Whitewater and Puente, Calif.; $5 million. Midwestern Constructors, Johnson Western Gunite, L. E. Dixon Co. Started May 1, complete Aug. 31; 23 miles completed last month. Also 1760-hp in Blythe station. Start July; finish Sept. 1.

SOUTHERN NATURAL GAS CO., Birmingham, Ala. For 496 miles from Gwinville (Miss.) gas field to Aiken, S. C., and 311 miles of laterals, 11,600 hp compressor additions, 7600 hp in new stations. Sheehan Pipeline Construction Co. building 236 miles in three parts: Three 24-in. loops, one in Mississippi, one in Alabama, one in Georgia, total 24 miles; 180 miles of 18-in. from Gwinville to Selma, Ala.; 32 miles of 16-in. from Wetumpka, Ala. to Tallassee, Ala. One spread has started at Yazoo City, Miss., and one at Carrollton, Ga. J. L. Cox & Son, Raytown, Mo., stringing the 24- and 18-in. To complete Sheehan contract Nov. 1, 1950.

SOUTHERN UNION GAS CO., Dallas, 8 miles to Espanola, N. Mex., 1600-hp compressor. Geo. Tucker, Odessa, and Foor Engineering Co., contractors.

TENNESSEE GAS TRANSMISSION CO., Houston. has Latex Construction Co. working on 101 miles of 30-in., 68 miles of which is from West Monroe to Natchitoches, La., with same crew to lay 33 miles from Jones, La., to Mississippi river when former job is completed; 71 miles of 16-in. and 12-in. from Kinder to Grand Chenier, La., 95 miles of 20-in. from Natchitoches to Kinder begun last month; 105 miles of 16-in. from Kinder to Bayou Sale, La., begun last month; installation of 16-in. temporary line on Mississippi river bridge at Greenville, Miss. H. C. Price Co. about complete on 220 miles of 26-in. from north bank of Ohio river east of Portsmouth, Ohio, through Ohio; remaining 153 miles on to Buffalo through New York and Pennsylvania ready to start. Price also laying 174 miles of 30-in. in western Tennessee and Kentucky.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston, on its Texas-to-New York line. Omaha Dredge & Dock Co. started Hudson river crossing in mid-July. Latex Construction Co. is working three spreads on 4- to 14-in. gathering system in Louisiana. R. H. Fulton expects to finish laying 200 miles of 30-in. in August. Texas-Southern Contracting Co., Fort Worth, was starting in mid-July 92 miles of 30-in. from Porters, Texas, to Sabine river; was past mid-point on 50 miles of 18- and 20-in. from Eunice, La., south. Shanks & Eustace Inc. started July 19 laying 38 miles of 4- and 6-in.

UNITED GAS PIPE LINE CO., Shreveport, about completed on 12-in. line out of Soso field in Mississippi. Texas - Southern Contracting Co., Fort Worth.

Pipeline People

J. W. Stovall

W. A. Meiter

WILLIAM A. MEITER has been selected by Worthington Pump & Machinery Corp., Harrison, N. J., to fill the new position of central sales manager. The Buffalo, Detroit, Cleveland, Cincinnati, and Pittsburgh offices will be under his jurisdiction. JOHN W. STOVALL has succeeded Mr. Meiter as manager of the Buffalo district sales office.

HEWITT A. GEHRES, executive vice president and director of engineering, The Cooper-Bessemer Corp., Mount Vernon, Ohio, recently received the honorary degree of doctor of science from Grove City (Pa.) college. Mr. Gehres was congratulated on his important accomplishments in the engine-building industry during his 40 years with Cooper-Bessemer.

A. T. AGERN, who has been promoted from engine representative to district representative in Pendleton, Ore., is one of five men recently named to new positions by Caterpillar Tractor Co., San Leandro, Calif. C. K. HEDGES is district representative at Salt Lake City, succeeding E. A. TIARKS, who has been transferred to Seattle. Mr. Tiarks will be assisted by R. M. RICHARDS, Portland, former agricultural representative. H. A. MANUEL has been transferred from Portland to Fresno as district representative.